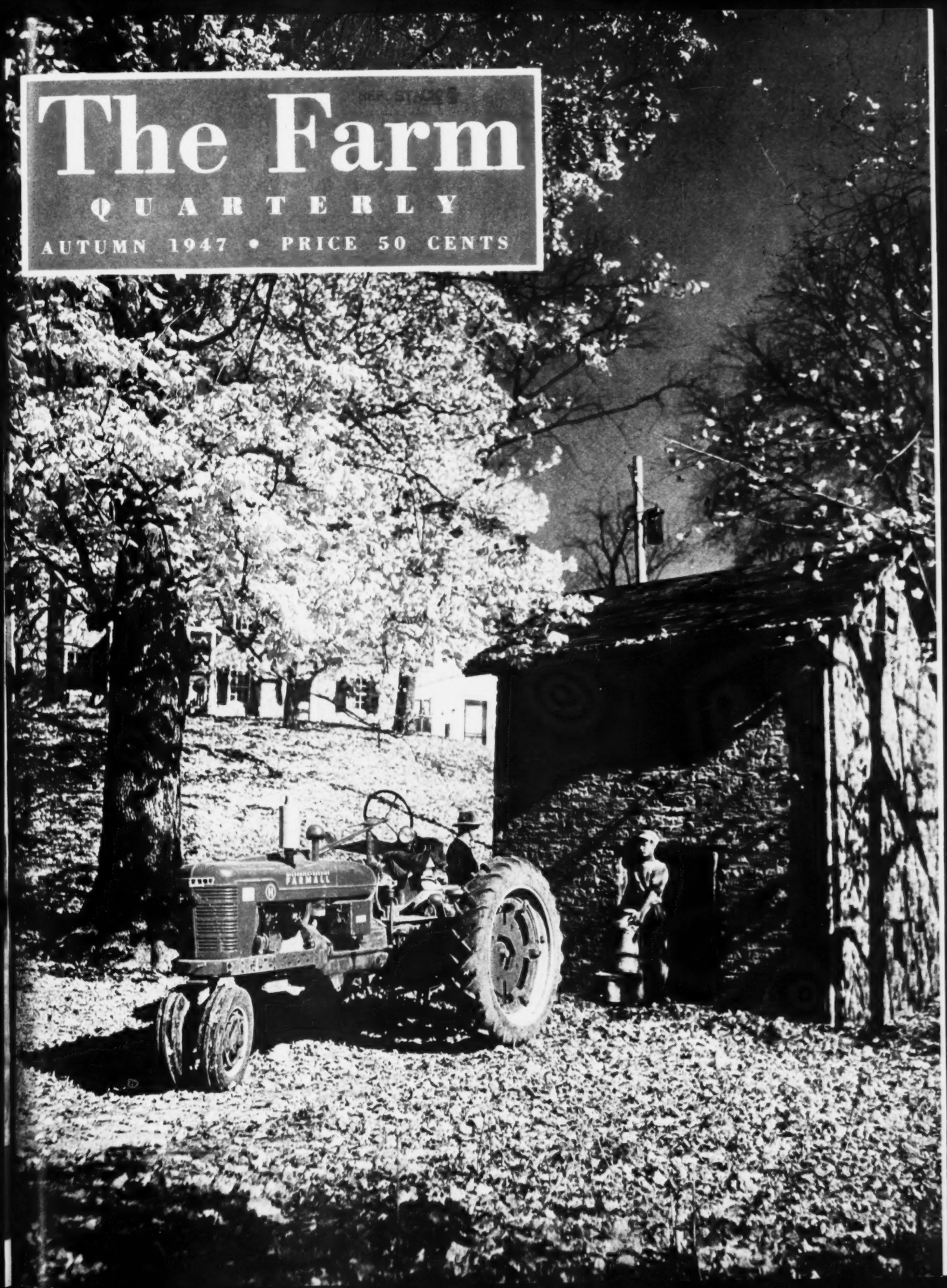
The Farm

QUARTERLY

AUTUMN 1947 • PRICE 50 CENTS



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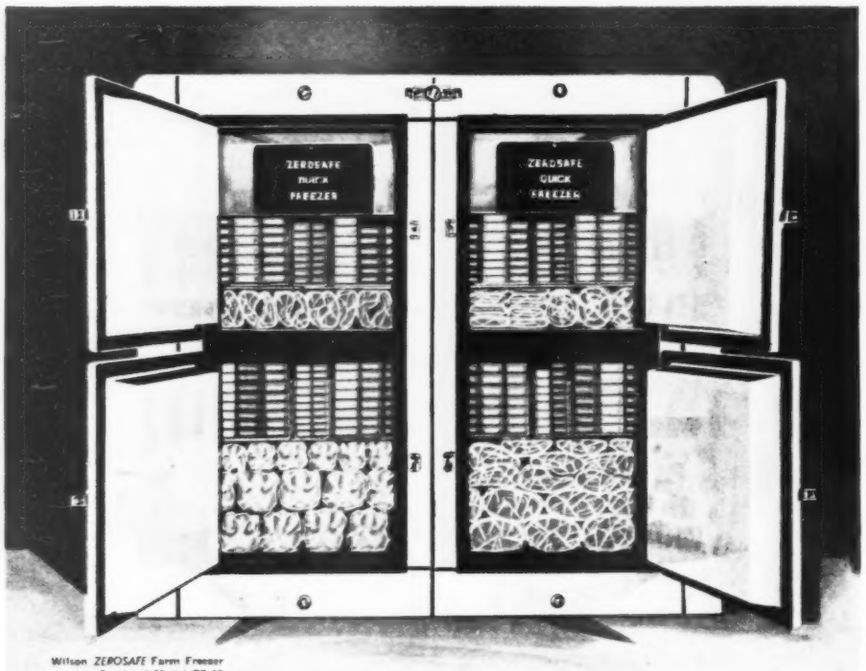

Wilson *ZEROSAFE* Farm Freezer
Sectional Model FF-60

WILSON "ZEROSAFE" Model FF-60 Farm Freezer (illustrated) will hold 2100 lbs. of food at the conservative average of 35 lbs. per cu. ft. Other models from 15 cu. ft. to 120 cu. ft.

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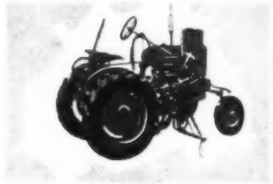

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Cultivators for every crop

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Faster, easier work . . . all-purpose capacity and *economy*. That's what the new Farmall Cub tractor brings to the small farms and truck gardens of America!

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DE LAVAL MAGNETIC SPEEDWAY MILKER

1 UNIFORM MILKING — Uniform milking maintains highest production. The "Magnetic" Milker is the only *uniform* milker and always milks *correctly*.

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The new postwar De Laval Sterling Milker leads all milkers of its kind in fast, precise and comfortable milking. It is simple, dependable and provides De Laval-quality milking at lower cost. Many profit-making improvements. Complete Sterling Milker outfits . . . or you can use Sterling stainless steel single or double units on your present milker pipe line to secure De Laval Better Milking.

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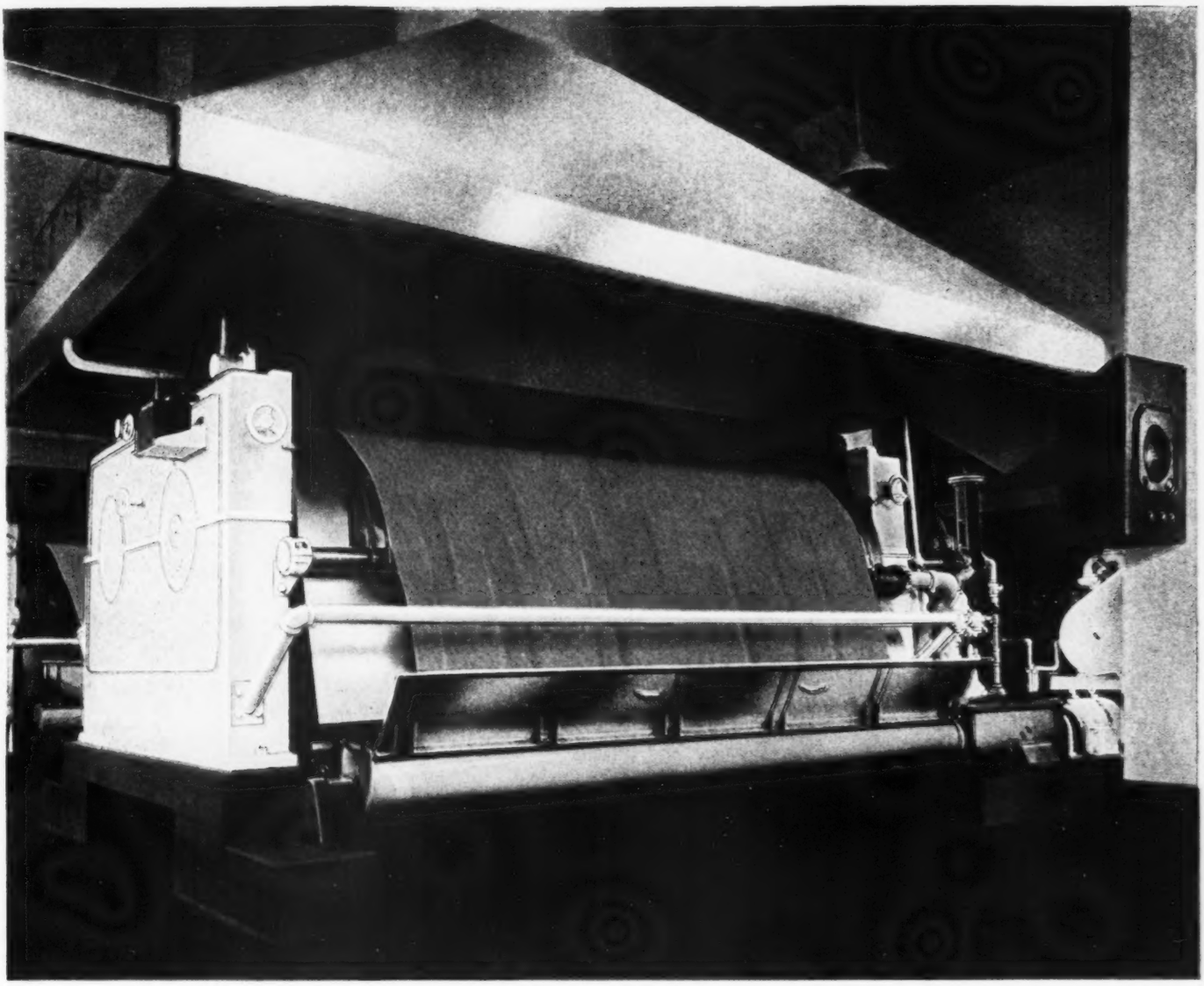

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Farm's Pictures

The following list, page by page, shows the source of each picture in this issue. When more than one source is represented on a single page, credit starts at upper left to right, top to bottom.

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THE FARM QUARTERLY
22 East 12th St., Cincinnati 10, Ohio

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Fred Knoop.....**Managing Editor**

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Contributing Editors: **Ray Dunn, Ralph Kenney, Robert Graham, Dave Roberts, Charles A. Reese, Banner Bill Morgan, George D. Scarseth, Myron S. Hazen, B. J. Killham, J. W Schwab, Charles Krutch, Virgil Overholt, Katharine A Smith, B. G. DeWeese, G. W. Salisbury, J. E. McClintock.**

Volume Two, Number Three. Entered as second-class matter February 20, 1946, at the Post Office at Cincinnati, Ohio, under the Act of March 3, 1879. Published quarterly by The Automobile Digest Publishing Company, Cincinnati, Ohio. Publishers of The Farm Quarterly, The Automotive Digest, Minicam Photography, Writer's Digest and technical books. Copyright, 1946. Subscription price 50c a copy; $2.00 for one year; $3.50 for two years; $5.00 for three years. Remit by postal money order or check to The Farm Quarterly, 22 East 12th Street, Cincinnati 10, Ohio. Title Reg. U. S. Pat. Off.

WHEN you give it the care and attention it deserves, your garden responds in the fullest measure. But, working in the garden is a chore you sometimes neglect unless you use the kind of tools that take out the drudgery. Dandy Boy farm and garden implements were specially engineered for folks who like to work in the garden and who take pride in doing a professional job. Dandy Boy implements put greater pleasure into gardening by making the job easier.

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Write us for the new Dandy Boy booklet. Dandy Boy farm and garden implements are sold in the better hardware or implement stores.

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IMPLEMENTS

LETTERS

BROMEGRASS

Sirs:

In connection with my article on Bromegrass, which is to be published in the Autumn issue of the Farm Quarterly, it occurred to me that Quarterly readers might want to know what a complete Bromegrass plant looks like. I am therefore sending a photograph in color of a four-foot plant. Attention is called to the extensive root system which provides an unusually large amount of humus to the soil.

Robert R. Johnson
109 S. Sumner St.
Beatrice, Nebraska

The tape beside this mature brome plant in full seed is 24 inches long. Note that the root system is approximately as long as the above-ground part of the plant.

Mr. Johnson's article appears on page 64.—Ed.

BUILD OR REBUILD
YOUR OWN
FARM IMPLEMENTS

WITH THE
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The new Miller Farm Welder is mighty easy to operate and it is ready to work on *your* farm.

● Miller is the Farm Welder with the now famous "Swing-Lock" heat selector. With the "Swing-Lock" heat selector you can use every amp. from 20 to 130 or 20 to 180, depending upon the model you select. There are no amperage plugs, taps or sockets to change, no cranks to turn. Simply swing the selector to the desired amperage and release. It will lock instantly in place. There are no missing amperes on the Miller Farm Welder. The important thing is that with a Miller you can select, easily, the right heat setting for the job and not work "too hot" or "too cold."

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● Completely equipped nothing else to buy!

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TESTS show that Champion Farmer Renk's Firestone Champion Ground Grips will clean up to 100% more effectively, pull up to 62% more, last up to 91% longer, and roll smoother over highways than any other tractor tires.

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A FARM CORPORATION, one of the first, has enabled Champion Farmer William F. Renk, Sun Prairie, Wisconsin, and three sons, Walter, Wilbur, and Robert, to build an efficient and profitable farm business. Last year, on 1053 acres in 7 farms, they produced more than 3 million pounds of grain and livestock... more than enough to load a freight train a mile long. Purebred Hampshire and Shropshire sheep earn top awards... bring highest prices. Their hybrid seed corn and certified seed grains are in demand. Soil fertility, through fertilization and an efficient cattle and hog plan, is high. Last year 50 acres of Forvic oats yielded 102 bushels per acre. Farm work is mechanized to the limit. The Renks, shown below, l. to r., William F., Wilbur, Robert, John (Walter's son), and Walter.

Write to The Firestone Tire & Rubber Co., Akron, Ohio, for more information about Champion Farmer William F. Renk.

Only **FIRESTONE CHAMPION Ground Grips Take a "CENTER BITE"**

DELICIOUS APPLE'S DAUGHTER

Sir:

I heartily thank you for the publication of the article written by Mr. Croy. He did a very fine piece of work on all essentials of the Delicious Apple. Yet I disagree with him—that it might have been a seed from a Bellflower or a Pippin or a Maiden Blush.

Its likeness to my father's Indiana seedlings which he grafted into his Iowa stock is very pronounced. A seed developed from these two—falling into the earth in his Iowa orchard—must have been the origin of the "New Creation." These seedling trees were large bearing trees when I first remember them—lived until 1890's. Its peculiar shape, pointed, one shoulder often higher than the other at stem end, having five small knobs, and extreme sweetness—are features of the Hiatt Sweet. Its larger size, red color, gold dots, plus quantities of sharp rich spicy juice—belong to the Hiatt Black Apple. The "New Creation" is indeed marvelous.

You may or may not be interested in this fact. Why my two brothers and I were considering the type of apples in our six acre orchard that could produce a Delicious—we were amazed at its likeness to the old seedlings.

I am indeed grateful to Mr. Croy for his consideration—speaking reverently of my father and his product. It is indeed a venerable old tree, and I have seen it much nurtured since childhood.

My father's greatest desire was that the public might enjoy his apple. When Stark Brothers took over his tree he felt rewarded for having waited so many years—they had the experience, the money and willingness to produce in large numbers, the trees. He died in 1898 never knowing of its fame.

Thank you for your fine publication. I am a friend to all Delicious Apple lovers.

Mrs. O. D. Silverthorne & Sons
R. 1, Box 8
Perriss, Calif.

"THE PUREBREDS WILL BENEFIT FROM CROSSBREEDING"

Sirs:

You are entitled to thanks and encouragement for the dispassionate and analytical article on crossbreeding of dairy cattle in the summer issue. Those who desire to know the truth on crossbreeding for dairy purposes will also find much of value in the article entitled "The Brahmans," though the latter is a beef breed.

Drs. Reed and Fohrman, as well as Mr. Hilder whose picture you show, are searching objectively at Beltsville and Washington for the plain truth about crossbreeding even as they are doing in various research projects with the pure dairy breeds, including inbreeding. Your exposure of their work as organized fact-finding can be resultful only of good. If crossbreeding should prove a practical tool for dairymen, the pure breeds will benefit through increased demand for superior animals.

Thomas E. Milliman
Terrace Hill
Ithaca, New York

THE LOYAL OPPOSITION

Sir:

My summer edition of the Farm Quarterly is unusually interesting to anyone primarily interested in dairy farming.

However, there is one article in it that I feel strongly inclined to undertake to debunk. I refer to "The Crossbred Cow." I heard the Chief of the Bureau of Dairy Industry expound his theories and give the results of his crossbreeding experiments at a meeting of the Purebred Dairy Cattle Association—manifestly a not very receptive audience, and the feature of his presentation that impressed me most was the number of holes that could be punched in it from beginning to end. I wish I had the time and the talent to come back with a debunking article, but when I see the type presented (I suppose, to be desired as typical), on page 56, I don't think a debunking will be necessary for anybody who knows very much about dairy cattle.

Junius G. Adams
Biltmore Dairy Farms
Asheville, N. C.

USDA APPROVES

Sir:

I want to take this opportunity to let you know how much we appreciate the very excellent article on *The Crossbred Cow* you published in the summer issue. Also want to compliment the very excellent journal you are publishing. The photographs are mighty fine and the subject matter is very well handled.

O. E. Reed, Chief, Bureau of Animal Industry
United States Department of Agriculture
Agricultural Research Administration
Washington 25, D. C.

FARM BREEDING

Sir:

I discovered your magazine by accident and certainly do enjoy it. One suggestion I have is that you use more care in selecting photographs depicting animals breeding and the like. We all know their matings are necessary for begetting young but young minds could be stimulated to possible wrong-doing by them. There is usually ample time to learn these things and they are best learned from parents. My five year old boy wanted to know what the two horses were doing as pictured in Dr. Glenn Salisbury's article on artificial breeding. I know Dr. Salisbury well, having been instructed by him, and believe he would agree with me.

Best wishes for your success.

Paul Christner
220 E. 10th St.
Bloomsburg, Pa.

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PIONEER
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CHAMPION HAMPSHIRE EWE - 1946 International Livestock Exposition. Har Mar Betty Boots, owned by Harmon Harper, Cromwell, Ind., won 22 out of 23 showings! Raised the Wayne Way. Harper says: *"It's Wayne for economy and results."*

94,371 LBS. MILK, 3,897.2 LBS. FAT IN 5 LACTATIONS - Lauxmont Admiral Primrose, as well as the entire high-producing Holstein herd of Martin Buth, Jr., Comstock Park, Michigan, has been fed the Wayne Way for a good many years. Says Mr. Buth, "Wayne Feeds have helped greatly in making such production possible."

$32 CWT. RECORD HIGH ON OMAHA MARKET - set by these heifers of Ben Spilker, Dewitt, Nebr. Started, grown and finished on Wayne Sweet Mix Pellets, Spilker says, "I lay a lot of credit to the fact that these heifers were raised the Wayne Way."

Compare these records with livestock and poultry performance on your farm. If it's results like these you want, stop in for a visit with your friendly Wayne Feed Dealer. Find out what Wayne "I.Q." *Triple-Tested* Feeds and the Wayne Way of feeding can do for you. There's a proved Wayne Way for every class of livestock . . . every feeding need. See your Wayne Dealer *today*, or send in the coupon below for full details.

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"In 1946 I started 7,000 Bronze poults on Wayne Turkey Starter," writes Harry E. Robeson, Frostburg, Md. "They did splendidly. During the first 6 weeks, my livability was over 96% which I consider extremely good. I followed the Wayne Way to the finish. The photo shows the splendid flock I had before marketing. Although all production costs were high in 1946, and selling price was less than the year previous, I made a profit of more than $1 per bird. I am very pleased with my good results on the Wayne Program."

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OTTAWA, KANSAS • U. S. A.

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AGRICULTURAL LABORATORIES, Inc.
1310 CHESAPEAKE AVENUE COLUMBUS 2, OHIO

COLLABORATOR

Sir:

I was distressed to see, when the *Barnyard Gold* article came out, that the name of my collaborator was missing from the by-line. Dr. Boyd Woodruff's name was on the original manuscript along with mine.

Dr. Woodruff supplied the scientific information in the article and as I do not wish to take credit which is not due me I would appreciate your mentioning this omission in your next issue.

Alden Stahr
R. D. 1, Basking Ridge, N. J

NO BULL

Sir:

As a contribution to the current farm safety program, some reader should point out that the picture on page 74 of your Spring issue gives a perfect illustration of HOW NOT TO LEAD A BULL. From appearances, the man in the picture has reached an age of some years in spite of the practice, but he may yet make Ed Bayard's famous roll of former bull handlers in the *Pennsylvania* Farmer columns.

Observe three things. The bull is held by a chain anchored around his horns, with which he could pull a load of two or three tons if he learned how to relieve the pressure on his ring. Secondly, he has been permitted to get his head down half way to the ground—just the right angle for a toss. And third, the handler has a grip too far out on the lead. His arm is not long enough to hold the bull's head away from his body.

Personally, I prefer a good strap to a staff for leading a bull, but the careless handler is much better off with a staff. A strap or rope lead should be snapped in the ring, and the ring should never be old and thin. In leading a bull I hold the strap about six inches from the ring, make him walk freely with his head up, and I never turn my head so that I can't see what he is doing and thinking. That way we get along fine, and I expect to live to be an old man.

E. R. Groves
Columbiana-Mahoning Jersey Club
Rt. 5, Salem, Ohio

ANYBODY SEEN SOLOMON?

Sirs:

I am a farm owner, but not an operator, however, I am very close to the farm in as much as I do most of my own repairing, fencing, painting, and general cleaning up.

My farm is tenant operated on half shares, it is not a large farm, 130 acres, and we have twenty Guernsey cows. I wish that some time in the future that you would write an article in regard to renters, in our part of the country up here we have a very poor class of renters, the general idea with them seems to be, "grab all we can for a couple of years and move" and they do just that.

I realize that some owners treat their renters pretty rough, but I do not operate that way, I would much rather lean over backwards to be fair than to take any advantage whatsoever, however, it seems that every time I start leaning I am the one that gets "Took.'

Here in this part of the country crops were about four weeks late in being planted, but do you suppose that a renter around here would work on Sunday even if he knew that it was going to rain on Monday? "No Sir."

So some time in the near future I would like to see a good outspoken article on the slackness of tenant farmers.

Carroll J. Weller
1188 North Park Street
Richland Center, Wisconsin

The "Walking-on-eggs" department of Farm Quarterly is preparing an article on the trials and tribulations of the tenant farmer and his employer. We will pay $2 for each letter containing 100 words or more that we use from either a tenant or his employer which both (1) outlines grievances, (2) suggests practical remedies.—Ed.

You can't beat a

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Two-Cylinder

TRACTOR

FOR *Modern Design...Proved Performance*

You've no idea of the great forward strides John Deere has made in general-purpose farm power until you see and drive one of these new "A" or "B" Tractors for the first time. Here are tractors in a class all by themselves when it comes to *modern* design and *proved* performance.

★ ### *New Engines*

with *cyclonic* fuel intake greatly increase engine performance and enable you to handle a greater percentage of your farm jobs in third or even fourth gear. You can choose either the *all-fuel economy engine* or the *increased-compression gasoline engine* which delivers even more power.

★ ### *New Hydraulic Powr-Trol*

is the nearest thing yet to completely automatic operation of tractor equipment. You raise, lower and adjust *both* integral *and* drawn tools at a touch of your hand on a convenient lever. It's an exclusive John Deere feature.

★ ### *New Roll-o-matic*

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Naturally, all of the outstanding advantages that have made John Deere Tractors famous have been retained in these new models. Their *exclusive two-cylinder* design remains unchanged. No other tractor design has yet been developed that approaches the John Deere in simplicity. There are fewer adjustments . . . fewer parts to wear, to cause trouble, and require eventual replacement. Remaining parts are larger, heavier, stronger—better able to stand up under the grueling strains or farm work. It is this simple, two-cylinder design that gives John Deere Tractors the fundamental advantages of greater economy, more dependability, longer life—advantages that lower your costs and increase your profits . . . that assure freedom from costly field delays . . . and that give you more years of service from your tractor investment.

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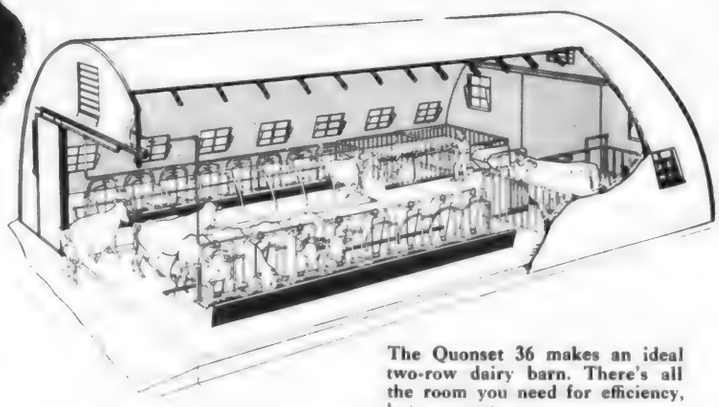
Introducing the QUONSET 36



The Quonset 36 makes an ideal two-row dairy barn. There's all the room you need for efficiency, but no waste space.

HERE it is—the new Quonset so many of you have asked for. It's 36 feet wide, and as long as you like, in extensions of 20 feet.

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Like all other Quonsets, the new Quonset 36 is steel throughout—framed with steel and covered with steel. It's easily and quickly erected. It's strong, sturdy, fire-resistant and termite-proof. And the exclusive nailing groove in the steel framing makes possible any practical arrangement of windows, doors and inside partitions you wish.

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With a base of concrete, cinder block or other suitable material, a two-story Quonset 36 can be easily erected. The Quonset 36 shares the versatility and adaptability of *all* Quonsets.

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family HARVEST

The farmer who knows his oats watches for the exact shade of deep gold that tells him the kernel milk has turned to hard dough. Beyond that — delay may be ruinous.

That is why the farm family welcomed its *own* All-Crop Harvester . . . ready to roll on an hour's notice without waiting for a threshing crew or custom rig.

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GREEN ISLANDS of crop lands now spot the arid deserts of Utah

The Mormon Land

BY GRANT CANNON

"THIS is the place I saw in visions. This is the place," said Brigham Young on July 24, 1847 to the first company of Mormons as they looked out over the Great Basin from the mouth of Emigration Canyon.

It was a magnificent and awful sight, a vast basin, desert dry, covered with the dust colored sage, bare in spots and wind eroded. Here and there a mountain stream, like a green finger, pointed across the arid waste to the west. Some of them disappeared into the ash-dry earth a few miles from the mountain's side; one or two reached their destination, the dead salt sea. The whole basin shimmered in the July heat and the lake, twenty miles away, seemed like a mirage. Like a mirage it was to mock them, for they were to learn that its water was so salty that no fish could live in it and the earth for miles around its shores was polluted. Surrounding the basin were the Wasatch mountains, broken jagged peaks rising to ten and twelve thousand feet, patched with snow the year round.

They had driven their wagons across the plains, stopping now and then to plant a field to be left for other companies to cultivate and still other companies to harvest. As they jolted along they had sung this song.

"In upper California, Oh that's the land for me. It lies between the mountains and the Great Pacific Sea" . . .

This could not have been the land of their expectations, but still the Saints rejoiced. Here in the fastness of the mountains these farmers and craftsmen from Ohio, Vermont, New York, Mississippi, and even as far away as England, would build their temple and plant their fields, free from persecution. Here they would be safe, here they could live their religion without fear of mobs or violence. The bitter memories of their burned homes at Nauvoo, the martyrdom of their Prophet Joseph Smith, the Haun's' Mill massacre, would fade into legend and, in their security, their own self-righteous thorniness would mellow.

A few of the more sensitive souls were appalled at the inhospitable waste which seemed to threaten them with its desolation. One of the three women broke down and cried, "Weak and weary as I am I would rather go a thousand miles farther than remain in such a forsaken place as this." A mountain man, Jim Bridger, who knew this region better than any other living person, told Brigham Young that he would give a thousand dollars for a bushel of corn raised in the basin.

This desert was a challenge; their lives were the stakes; the season for planting was passing and they must hurry. They gee-hawed their teams into action and the seventy-odd wagons started down into the basin. The men who drove the wagons, sitting high on the seat or plodding beside their teams, were mostly farmers, men who had turned the rich earth of the Mississippi and Ohio valleys, planting their seed with the full assurance that the moist soil would raise a crop. They looked gravely at each other as the iron rimmed wheels of their heavily loaded wagons barely rutted this hard-crusted earth.

←

IRRIGATION IS THE BIG JOB on a Utah farm but all of the tasks of the eastern farmer are here, too. Ernest Crawford dusts his seed onion crop with DDT.

BEFORE EACH IRRIGATION the furrows which guide the water must be cleaned out. Keeping the water levels uniform is an engineering problem often solved by trial and error.

The plan on which they were staking their lives was irrigation. It had been practiced since biblical times in the Old World, but so far as they knew, they were the first whites to try it in America.

Two days before Brigham Young and the main party entered the valley the advance scouts and road builders had arrived and pushed north to the forked stream that was later called City Creek. There they said a prayer of thanksgiving, and then like a well trained military organization, they began their assigned tasks. At dawn one group began building a dam across the creek; William Carter, Shadrach Roundy and George Brown began the plowing. The hard earth broke their plow shares and stopped their travel-weary animals. It was only after they had flooded the land with water from the dam that they were able to make any progress. Before darkness ended the first day this little group had plowed four acres of land, planted potatoes, parsnips, and wheat, and had started irrigating, which was to be the trademark of their agriculture to the present day.

When the main party arrived they found streams of water running down the furrows of the newly planted crop. On the following days the whole group joined in the work with desperate speed, for they knew that not only their own lives were at stake but those of a company ten times their size that was crossing the plains expecting to winter with them.

The Watch and the Shovel

Always, always the great problem was to move the water onto the land, diverting the water from its natural courses, building dams, cutting ditches. It has remained one of the major farm jobs in Utah. Every drop of the precious stuff must be used. If you waste it, it will be taken away from you. The only way that you can acquire title to water is to develop it, or buy the rights from someone who has developed it. Most water rights entitle a farmer to his share of the water in the ditch for a certain number of hours at regular intervals. When a farmer's turn to use the stream comes he will go to the head-gate with his watch and

a shovel. With his watch in his hand he will wait until the exact minute before he opens the head-gate and turns the water into his ditches. Every moment of the time the water is his he keeps it pouring over his land. After supper one of the sons will relieve the day man. All night long the water must be kept flowing over the fields and when it reaches the end of a furrow it must be moved. May the Lord help the boy who is caught asleep in the hay stack with the water flowing off the end of the furrows; it's the birch rod for him.

Night always adds a wonderful strangeness to this routine job; setting the canvas diversion dam in the dry ditch bed and mudding it down, then picking up the lantern and going up stream to take out the old dam; clearing the cut in the ditch bank with the shovel so that the water can flow over without tearing up the bank; following the water through the field, splashing along in rubber boots; checking to see that it is going down every furrow; digging out a clod that is daming it up here, and mud over a break in the furrow there. The coyotes howl, lonely as banshees, and far away another lantern can be seen moving across a field. The boy waves his lantern and the point of light makes a tiny answering arc.

Before the water enters the furrows and ditches of the fields, it must be brought from the mountain stream or lake to the land. Except for the limited area around the mouth of a canyon where the stream leaves the mountains this requires a difficult job of daming, ditching, flume building, tunneling, and even siphoning, to bring the water across the slope of the foothills to new land. The whole community had to cooperate on these jobs. A typical example is the project that brought water to the Hurricane Bench in southern Utah from the Virgin River, eight miles away.

A group of pioneer farmers organized the project. Careful surveys were made and it was decided that if a dam were built high up the narrow canyon of the Virgin River the water could be brought along the canyon wall and over to the Hurricane Bench. Like most of the rivers in this part of the country, the Virgin has cut a narrow precipitous gorge through the mountains where it is swift flowing and deep; but it flattens out into a wide shallow river as it reaches the level lands. Out there they say, "It's a mile wide and an inch deep; the only river in the world where the fish have to wear goggles to keep the dust out of their eyes."

After the dam site was located in the rocky-walled canyon the work on the canal was begun. For ten years they worked on the canal, which had to be carved into the cliff side. In places it was two hundred feet above the base of the cliff wall. It was carried by trestles over intersecting canyons. In nine different places it passed through tunnels cut through solid conglomerate rock.

AN EARLY PHOTOGRAPH of a pioneer and six of his wives in front of one of his homes.

HURRICANE BENCH before irrigation changed it into one of the fruit raising centers.

GEORGE Q. CANNON and half of his sons show there was no labor problem on Utah farms.

"UTAH'S GREATEST PRODUCT" comes home from school balancing on the edge of a ditch that carries the run-off water from the fields to irrigate the lawns and gardens in town.

One of those who built the canal, James Jepson, now ninety-three years old, says, "It was hard leaving our families alone, but the work was much easier in the winter than it would have been in the heat of the summer. Our main difficulty was in getting cash money to buy explosives to blast the tunnels. Merchants who had the money said, 'We admire your courage but damn your judgment.' Finally I went to the President of the Church to try to borrow five thousand dollars for the explosives. I told them, 'We are going to finish this job whether you lend us the money or not, but if you don't the people who should have the land won't get it.' The President said, 'I see that the five Bishops of the five wards in that area have signed your petition for help. How much do these wards pay in tithing?' One of his assistants reported that they paid a little over five thousand dollars a year. 'Well, if the Bishops think that is what should be done with their money I am in favor of it,' Brother Smith said."

Finally the canal was finished, but mishaps plagued the builders. Three diversion dams were destroyed by the turbulent Virgin before they succeeded in stemming it. All this was done to add two thousand acres of desert land to the farming area.

As was true of most Mormon communities, the town was laid out and the farm land divided before settlers moved in. Each of the pioneers drew lots for a half acre town plot and twenty acres of farm land. Ten years of hazardous back-breaking labor went into twenty acres and a building site. Even today, one hundred years after the first settlers arrived, only 3.3 per cent of the land is tilled.

The pattern of this project is typical of most of the Mormon country. Each man was allowed only as much land as he could cultivate, and he acquired his land by working in the cooperative effort to bring the water to it. As the water was brought to a field it was planted and irrigated while others continued the ditch. The crops were shared while the work went on until each of the group had his own land under cultivation.

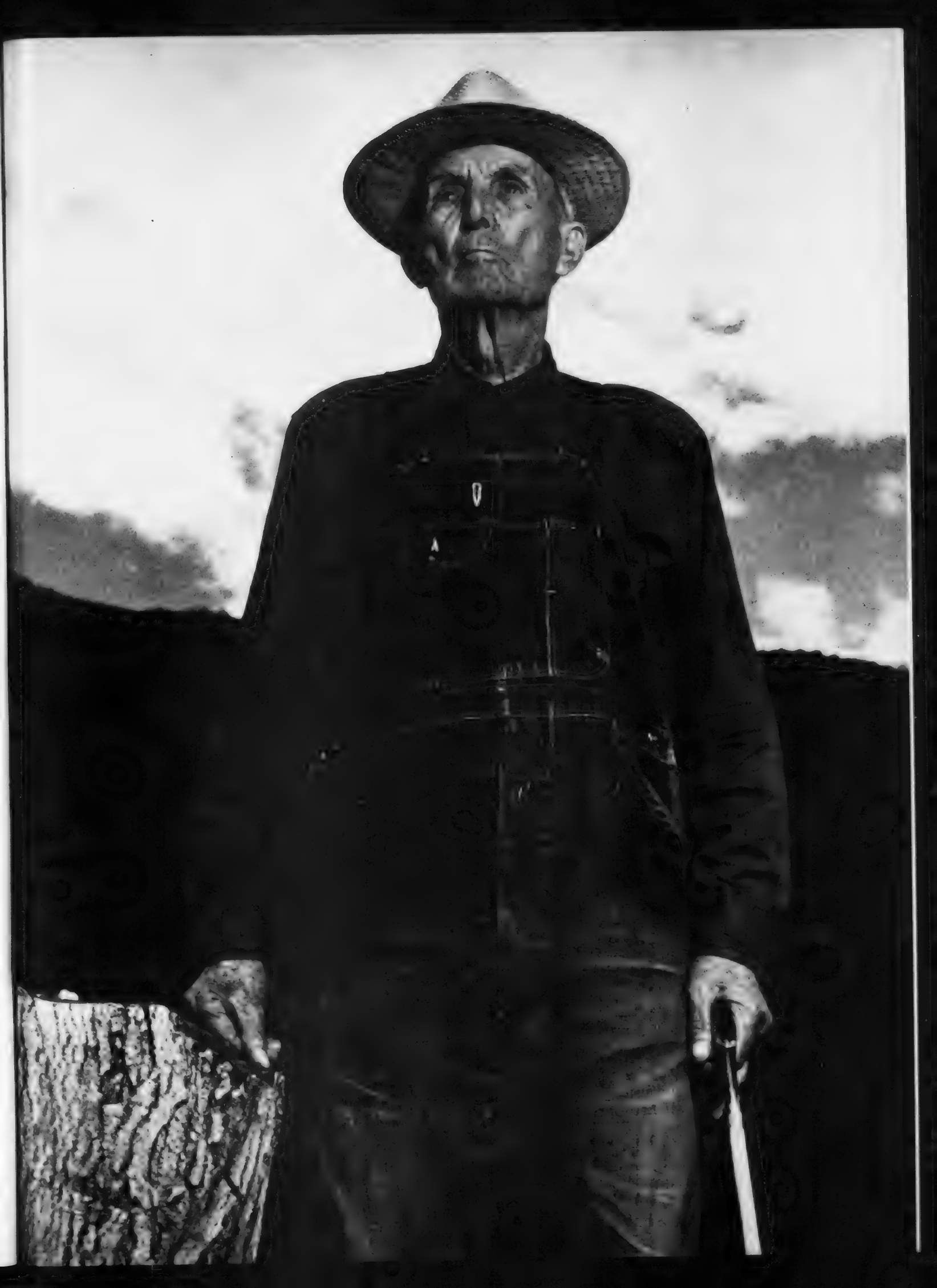
With small farms the land must be intensively cultivated. The main irrigated crops reflect this. They are sugar beets, potatoes, peas, beans, celery, carrots, and feed crops.

To date, beside the work done by the settlers themselves, the U. S. Bureau of Reclamation has spent over $15,000,000 on irrigation. The need of all this is two-fold: beside the obvious value of watering the new lands, the irrigation projects are vitally important in erosion control. The reason immense amounts of water are needed in this arid country will be understood when you consider that to produce an acre of crops the farmer must pour on the land four or five acre feet of water each crop year. This is equivalent to a pond five feet deep covering an acre of land.

The Soil

Although an immense amount of effort is necessary to make this dry land produce, there is a compensation in the fertility of the soil. Like a blind man who has developed his sense of hearing and of touch far beyond his more fortunate brothers, so the soil of this arid country is compensated by nature for its lack of moisture; its defect is also the cause of its strength. Because there is little water the soil is not leached of its valuable minerals, nor is silt carried down to form a

NINETY-THREE YEAR OLD James Jepson, first President of the Hurricane Canal Company whose sightless eyes still hold the vision of the victory of man over the desert.



SCHOOLBOYS PLAY on the trestle supports of the Hurricane Canal and grow up on the land that their grandfathers reclaimed from the desert with work and water.

THE PARCHED SOIL splits and opens gaping cracks; the packed earth draws water from the sub-soil to evaporate; so a loose dry mulch is used to protect this arid land.

MILLARD HALTERMAN has built an earth dam in the irrigation ditch to divert the water to the fields while his sons check the furrows to keep the water flowing.

THE TRACTOR and the team are both used on dry-farm land. This land, which is to lie fallow, must be protected from the sun by creating a dry mulch with the harrow. If a summer shower wets the earth and packs it the job must be done over again.

stratum of clay a few inches below the surface. Usually the soil has a uniform texture to a depth of many feet. This great depth of uniform permeable subsoil caused Dr. E. W. Hilgard, one of the early students of soil, to remark, "The farmer in the arid region owns from three to four farms, one above the other, as compared with the same acreage in the eastern states." The actual fertility of the soil is largely dependent on the mineral content of the original rock from which it is formed. The soil of this arid region contains over ten times as much lime as humid soils, over three times as much potash, twice as much alumina, once and a half again as much soluble silica and phosphoric acid. But it does lack humus, having eight per cent less than humid soils. Even in the lesser amount of humus there is a compensation, for the plants that grow under dry conditions give to the soil over three and one half times as much nitrogen as plants grown in a more moist region. Though the pioneers did not have a chemical analysis of the soil they soon discovered a very practical test of the fertility of a piece of land. They found if a healthy crop of sage brush grew on the land they could be certain of its fertility; rabbit brush indicated a somewhat less fertile soil; and they soon learned that if the only native vegetation the land could support was greasewood, shadscale, or salt grass, the land was not worth farming.

Starvation and Crickets

When the ground was broken and the first crops planted the battle was joined between the pioneers and this arid land. It was to be three terrible years before anyone could feel confident that their bridge-head was secured. The yield from the first crop, planted during the last days of July and early August, was very meager, but it had to be shared among the 1700 Saints who had arrived before winter cut off further travel in the mountains. By the time the first snows had fallen nine hundred acres of winter wheat had been planted and other land prepared for the spring. Before leaving the valley for winter quarters with his oncoming people, Brigham Young set ambitious goals for the settlers. He said in his final speech to them, "I want to engage 50,000 bushels of wheat and the same amount of corn and other grain in proportion. I will pay you $1.25 per bushel for wheat and 50 cents for corn. Raise all the grain you can, and with this you can purchase sheep, cows, teams, and the like for those who come here later on."

That first winter thistle roots, sego lilly bulbs, wild greens, and berries were all gathered and eaten; wild game was hunted and trapped and even rawhide was boiled into a gelatinous soup.

Priddy Meeks, one of the pioneers, wrote in his journal, "My family went several months without a satisfying meal of victuals. I went sometimes a mile up the Jordan [River] to a patch of wild roses to get the berries to eat which I could eat as rapidly as a hog, stems and all. I shot hawks and crows, and they ate well. I would go and search the mire holes and find cattle dead, and fleece off what meat I could and eat it. We used wolf meat, which I thought was good. I made some wooden spades to dig segos (the root of the sego lilly) with, but we could not supply our wants."

It was a rugged life but their morale was high and they retained a mordant sense of humor. In a letter written to relatives in the east one women said, "and for Christmas dinner we had a leg o' nothing with no vegetables." They chuckled over the Irish recipe for potatoes-and-point,

A BAND OF STRAYING SHEEP are turned back to join the flock on the mountain where they pasture in the summer. In the winter they will be taken to the desert.

"Boil up a mess of potatoes and point a herring at them to give them strength and flavor."

With the coming of spring the new settlers might well have felt a sense of victory as they looked over their growing fields. But this was war, and the counter attack was devastating and unexpected. Any feeling of elation was cut short in May and June of 1848 when a black army of crickets rolled down the mountain sides and swept across the green fields.

Lorenzo Young wrote: "May 27, . . . today to our utter astonishment the crickets came by the millions, sweeping everything before them. They first attacked a patch of beans for us, and in twenty minutes there was not a vestige of them to be seen. They next swept our peas, then came into our garden; took everything clean. We went out with brush and undertook to drive them, but they were too strong for us."

Every person in the valley was marshalled to fight off the invasion. Trenches were dug around the fields and filled with water from the irrigation ditches, but though tons of the black crickets were drowned others poured over this barrier and onto the land. Lines of fires were set in the fields to burn off the pestilential hordes, but still they came on. In desperation, men, women and children went through the young crops beating back the crickets with brooms and flails.

The Miracle of the Gulls

Then occurred what the Mormons believe to have been the direct intervention of God, the miracle of the sea gulls. Priddy Meeks, along with the others, saw the wonderful thing happen. He had paused in the middle of his field with a brush flail in his hand. He was near exhaustion from days of endless fighting. He brushed the filthy black devils from his arms and legs and clawed one out of his beard. They were even swarming over him now, as though they might make an end to him as well as to his crop. Suddenly he saw the glint of sunlight on white gull wings and heard the hoarse cawing of the birds. Literally thousands of sea gulls were flying in from the islands of Great Salt Lake. For a few terrible moments he thought that the birds had come to eat what the crickets had left, but as he watched the gulls began gorging themselves on the crickets. When they had eaten all that they could hold they flew away and regurgitated and returned for more.

Nature's counter-attack was not limited to the crickets; it was a two pronged pincers movement. On June 4, 1848, there occurred one of those events which still puts cold fear into the hearts of farmers, a late frost. The tender growing plants

(Continued on page 44)

AS A TILLAGE TOOL, the old moldboard plow may not be all things to all soils. The disc plow may do a better job under some conditions.

DISC PLOWS

A DIFFERENCE of opinion not only makes horse racing popular but it also accounts for the wide variety of farm machinery used for similar jobs of cultivation and seed bed preparation. However, until a few years ago, the universal implement used for the first step in preparing ground for planting was the moldboard plow, which we all know as the "breakin' plow."

Then the wind changed, and a storm broke around the old plow. Some scientists as well as crack pots advocated sending it to the scrap heap. One of the implements suggested to take its place was the disc plow. This implement has long been a standby in the West where the moldboard failed to do its job in dry, hard soil and on fields where it was desirable not to cover crop residues completely. It was quickly accepted in the South. Its origin stemmed from the disc harrow, now in general use throughout the country.

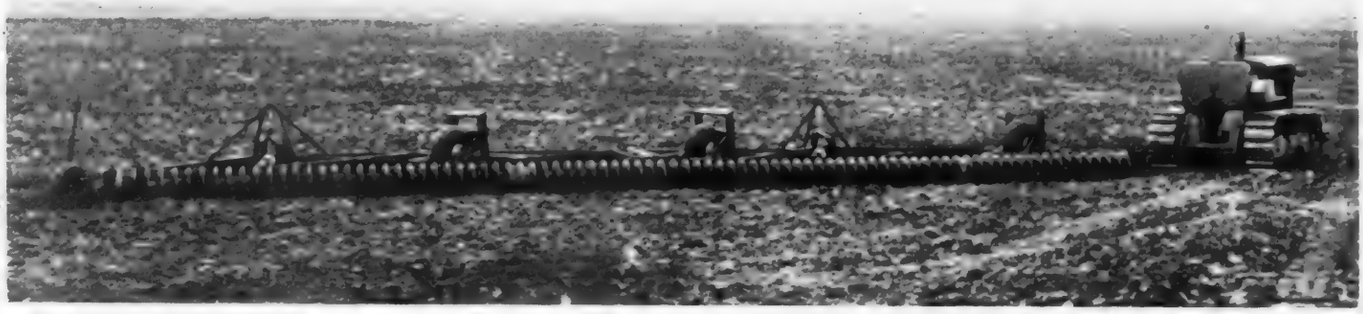
That the disc plow can replace the moldboard plow on all farms in all sections and under all conditions is a piece of dream-like thinking that is not borne out in practice, as every farmer knows. In some sections it is the only ground-breaking implement that can be used, and in certain soils everywhere it is a practical tool, but it is far from being a universal substitute for the older plows.

Why are farmers around the country using disc plows, listing plows, one-way wheatland plows, deep tillage subsoil plows, and the disc harrow for identical purposes? The answer is, no one style and size of plow can turn all soils and meet all seasons with equal results.

Disc vs. Moldboard

Where the moldboard plow works well there are only specialized uses for the disc plow. If the disc plow does the best work and the season, locality, soil and

THIS 60-FOOT HOME-MADE king size sodbuster, said to be the largest plow in the world, turns under a quarter-section a day for Monroe Terrell, Hugo, Colorado.



crop requirements favor its use, there is equally no good reason why the moldboard plow should be used. Where it is absolutely essential to completely turn under surface growths, stalks and trash (in corn-borer territories this is very necessary) the moldboard plow will, as a general rule, do the best work. If small grain stubble is to be mixed with the soil and is not to be completely turned under, the disc plow without scrapers and having each disc revolving independently will do a better job. However, the wheatland disc plow, which is a series of discs working together, because they are mounted on the same shaft, would be still better for the reason that approximately 60 per cent of the stubble mixes with the soil and about 40 per cent stays on top as a wind erosion preventive. If the wheatland disc is not available the disc plow will do this job in a very satisfactory way provided the discs are set in to their narrowest setting.

For sticky or waxy soils, hardpan and gumbo, the disc plow is the better tool. In these soils there are generally some scouring troubles with the moldboard plow. In stony ground the disc plow has the big advantage of rolling over these obstructions, doing no damage to the plow, while the moldboard plow will hang up and in many cases cause some breakage. In very loose soil the disc plow is preferred for the reason that dirt rolls with the discs and the trash does not clog and wedge in between disc standards and bearings. In this condition the moldboard plows tends to push the soil with a boiling action—similar to the action of a blade scraper, causing the dirt, if wet, to stick to the moldboard. This results in poor scouring. In dry soil the covering of trash would not be good, for much of the heavy trash would hang up on coulter shanks of the moldboard plow or wedge in between the plow beams to eventually work back through the beams and remain on top of the plowed ground.

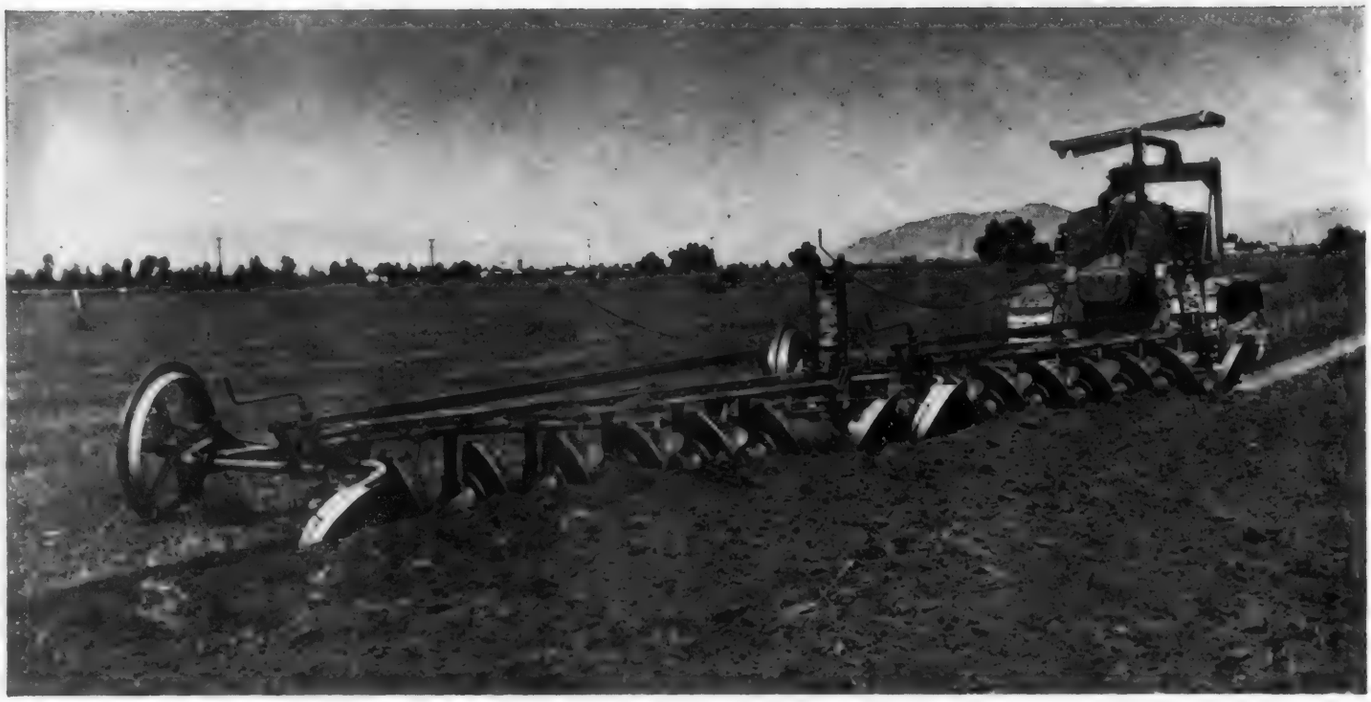
To plow soils that have an abundance of trash on the surface, or that have a heavy top growth, the disc plow will go down deep and do a good job of covering when equipped with the moldboard type of scraper. This type of scraper is shaped like a plow moldboard and effects the necessary curve upward and out, to invert the furrow slice. Then, too, the disc plow leaves the soil loose with no plowsole, so that water enters the subsoil quickly. The moldboard plow turns a furrow to invert the soil, whereas the disc plow cuts a slice and rolls it over to leave a smooth surface, well broken and pulverized. It can also be used to leave a lumpy surface by widening the cut, which is desirable in some areas for holding snow and rain for storage, and to prevent erosion.

The disc plow gets penetration from weight and the rolling, cutting action of the discs. The moldboard plow gets penetration from suction more than it does from weight. The farmer who expects to be able to do all-summer plowing with a mold-

A DISC PLOW will turn the soil in muck land that fails to scour a moldbord.

HEAVY COVER that would clog a moldboard plow is chopped and turned by the disc.

A DISC PLOW turns some of the stubble and leaves some on top to prevent erosion.



HITCHED TANDEM, these extra heavy disc plows are preparing a seedbed in one operation on a small grain ranch. Discs on the heavy plows go 16 inches and over.

THE ANGLE of the moldboard-type scrapers determines how much of the crop residue and cover crop are turned under. The disc plow leaves no hard-packed plowsole.

board plow has the problem of forcing the plow into the ground when it is rock-hard in the dry season. The plow has to be weighted to get it into the ground and this is not always satisfactory. It puts a very heavy pull on the tractor, and the plow may be damaged by the abnormal strains put on it. Shares are worn out sooner and the constant strain may twist or break them. If this damage is excessive the purchase of a disc plow is recommended. It has sufficient weight, and with the knife edge discs the penetration is quick and easy. Disc plows have heavy frames, large cast wheels, and extra weights for the wheels. Large and heavy discs, sizes 28 to 32 inches in diameter, are demanded only on the West Coast and in some foreign countries. They are not used on the average Midwest farm.

On many farms now using moldboard plows exclusively the disc plows could also be used to good advantage under certain conditions. It would be more profitable to own both styles and plow at the proper time and depth rather than to let the important job of plowing drag along, or neglect it entirely.

The disc plow can be used best in localities where fall-sown crops are to be planted and where there is little or no summer rainfall. With it the soil is put in condition to receive and hold the moisture when it comes after planting. Summer plowing of the hard soils destroys grasshoppers, pests and other insects which lay eggs in the hard ground. Destroying the grasshopper crop—one of the greatest menaces in the plains area—justifies the addition of a disc plow on any farm where stubble and hard soil may be turned immediately after harvest. To plow hard, dry soils with the moldboard plow, cast shares of narrow cut, double deep suck design should be used. If this fails there is only one remedy—the disc plow. Cast shares are less expensive than steel shares and in dry soil scouring is not a problem.

It is generally true that the moldboard plow will do a better job of inverting the slice, if that is what is wanted, but it is also a fact that it cannot work in the many soils adaptable to disc plowing. In light, sandy soils the moldboard plow will turn a better furrow, and where scouring is not a problem it will do better work. It will work considerably better than the disc plow in very heavy weed-infested fields or grasslands where a thorough job of covering is essential.

Early plowing means early sowing. Early sowing means a good start before freezing weather sets in. When the soil is hard and dry, follow the harvest with the disc plow and get the planting done. Very often in a dry season, if plowing is left to drag along because the ground is too hard for the moldboard plow, weeds get a head start. If the plow follows closely on the heels of the harvester, there will be less of a gamble on boths weeds and weather.

The disc plow can successfully handle or plow gravelly soils. Plowing in this type of soil must be very deep and, therefore, the narrow cut and turning motion of each disc separates the gravel more effectively than the moldboard,

which makes a wider cut. The narrower the discs are set, the better the disc plow works in gravel. In New England, however, chilled moldboard plows are widely used and liked.

Whether set for minimum or maximum cuts the disc plow always does equal quality work, while to take a wider cut than the single moldboard plow was designed for results in poor plowing. There is little if any difference in the draft of the two plows. It would seem that the disc plow would pull lighter than the moldboard plow because of the apparent narrower cut of the disc and also because there is less friction of the soil on the discs than on the moldboard. However, if both plows cut the same width and depth the pressure of the ground applied against their cutting and lifting parts is the same because both are turning an equal volume of soil.

How the Disc Plow Works

The disc plow turns over the ground with a rolling motion. It can be set to plow deeper than the moldboard plow and makes possible the breaking up of the plow-sole and the bringing up of new, available sources of plant food.

Then, too, the rolling motion of the discs turns the soil without packing the furrow bottom, leaving it loose and in good condition for absorbing moisture, allowing the roots to penetrate to the proper depth. The disc plow will also pulverize the soil thoroughly, making a perfect, mellow seed bed. The ground is left in such friable condition that in many instances the disc harrow need not follow to pulverize and pack the soil, which always is necessary if the furrow is turned and the surface left rough and lumpy. In dry adobe or rough virgin soil the disc plow works equally well.

The disc plow will work successfully in soils where there are many roots, shrubs and bushes. The larger size discs will cut off a root as thick as the wrist and will ride over stones and small stumps that would stop a moldboard plow cold. It is adaptable to soils containing a high percentage of organic matter like peat and leaf mold. Here, there is not pressure enough to cause the moldboard to turn a furrow.

For heavy grubbing the heavy-duty moldboard brush breaker with a well-sharpened roller coulter is preferred by some to the disc plow.

In heavy growths of brush and thicket the disc plow has clearance to allow free passage to the discs for coverage. It cuts the roots with a clean, revolving cut. That is, the cutting edges do not tear—they turn and cut instead of shearing and sometime tearing like the moldboard share.

The disc plow is a fine terracing tool and by doubling back any size terrace can be thrown up. It is ideal for roadside and field ditching because the earth can be thrown entirely out of the furrow. At high

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POWER REQUIRED depends on the weight of earth turned, not on the type of blade.

A SINGLE OR DOUBLE disc plow is an ideal implement for throwing up a terrace.

TILLAGE, seedbed preparation, and planting in one operation with this combination.

FLUES OF ROUGH LUMBER and hardware cloth, fitted to holes cut into the walls of steel cribs, will prevent corn spoilage.

Ventilate and Save

BY R. C. MILLER

Proper air circulation is one answer to this year's soft corn crop

THE mechanical corn picker has permitted the speedy harvesting of corn and has cut down labor costs, but hidden within this marvelously efficient machine is a gremlin who sometimes steals all the labor gains and time savings. The gremlin's name is *Spoilage*.

In a normal year the selling price of 30 per cent of the American corn crop is marked down because of high moisture content, or storage losses and damage. In a bad "soft corn" year the losses run higher. In 1945 and 1946 when two record crops were harvested, there were more than a billion bushels of corn which farmers had to sell or feed at a penalty.

With corn at $1.50, it doesn't take much arithmetic to convince the average farmer that even light damage to one-third of his crop adds up to a pretty penny every year.

Why Big Losses

With mechanical corn pickers it is important to harvest early in the fall to avoid the rain and snow common in November. This means the corn is stored with a higher moisture content than formerly. Earlier storage puts the corn in the crib in warmer weather, which encourages heating. To add further to the storage problems, the mechanical pickers harvest the corn so rapidly that cribs are filled to capacity in a few days. With the old method of hand husking standing or shocked corn, cribs are filled more slowly, and the corn is more likely to be spread in thin layers throughout the crib, which provides more ventilation to dry and cool the corn. There is also less opportunity with mechanical pickers to sort out wet or damaged ears or remove husks and silks which interfere with ventilation. The

IN THIS CRIB flues of rough lumber and hardware cloth are spaced four feet apart, vertically and horizontally, and staggered. Openings are cut at each end. They are fastened with temporary cleats, to permit easy removal of the flues when the crib is emptied.

HOW CORN IS GRADED

Grade No.	Min. Test Wt. Per Bu.	MAXIMUM LIMITS OF			
		Moisture Content	Foreign Material	Spoiled Damaged	Heat Damaged
	Pounds	Percent	Percent	Percent	Percent
1	54	14.0	2	3	0.1
2	53	15.5	3	5	.2
3	51	17.5	4	7	.5
4	48	20.	5	10	1.0
5	44	23.	7	15	3.

SAMPLE GRADE: Includes corn not within requirements of No. 1 to No. 5 inclusive; or which contains stones and/or cinders; or which is musty, or sour, or heating, or hot; or which has any commercially objectionable foreign odor; or which is otherwise of distinctly low quality.

mechanical pickers also result in more shelled corn than hand picking. The shelled corn fills the air spaces between the ears and retards ventilation, which encourages heating and molding. The rapid rate of harvesting has made elevators at the crib essential for preventing a bottleneck. And elevators drop the corn from considerable height, shelling still more corn.

In areas where corn is cut and shocked and later husked by hand or shredder, there is considerable drying in the shock. There is cleaner husking and wet or damaged ears are sorted out. Furthermore, shock husking is usually done later in the fall when the weather is colder. Much of the corn is fed as husked, so that there is less corn stored. With early fall picking there is more corn to store, resulting in overloading of cribs. Sometimes even the driveway between double corn cribs is filled. This practice stops almost all ventilation, so that mold and heat damaged corn is almost a sure result.

With the increasing use of mechanical pickers and the possibility of a corn combine which would shell the corn as it is husked, farmers require better bin ventilation.

Most farmers have a notion that they are losing more corn in storage than they should. If they haul it to the elevator and take a direct cut in price because it is not up to par, their notions about losses crystallize. If they feed the corn out, these losses are not so apparent because cattle and hogs will eat below-par corn if they are hungry enough and the moldy ears and grains that are refused by stock go into the manure pile unnoticed. It is likewise difficult to measure the loss of feed value of spoiled corn.

This loss of corn as well as other small grain in storage can be prevented by the use of very simple and inexpensive ventilating devices developed during the past few decades.

Ventilate and Save

The old method of storing ear corn in narrow cribs, often only three or four feet wide, located where there is free movement of outside fresh air, is still one of the best and cheapest methods of drying and storing corn. An ear of corn within two feet of circulating natural air will dry out satisfactorily even if quite high in moisture.

Free air movement around all ears can be provided in wider cribs by placing air channels across the crib at close intervals. The use of wooden fence rails, strings of drain tile and even boards for cross ventilation channels is probably known to most farmers. Such devices are helpful, but not entirely successful for many reasons. Often they are not available when needed. Although they furnish very small channels for air movement, a large volume of air is needed to dry and cool high moisture-content corn in warm, damp weather.

Stored ear corn will keep well at all

temperatures without moulding or heat damage in a tight bin when the moisture content is below 14 per cent; during the cool months (temperatures below 55° F.) it will keep in a tight bin when the moisture content goes to 18 per cent. In narrow cribs around which the air can circulate freely, corn with a moisture content up to 25 per cent will usually keep during the cool months. During the warm months, when the moisture content goes beyond 14 per cent it will be damaged by mold or heat in a tight bin. Therefore, corn stored in tight bins with a moisture content beyond 14 per cent in the warm months must be ventilated. With proper supplemental ventilation by means of flues, corn can be stored safely with a moisture content averaging 35 per cent but should be examined frequently. During the hot dry fall days it will dry out rapidly.

Moisture Determinations

It is difficult to determine the moisture content of corn or grain by inspection. Only corn or grain that feels dry and hard when not frozen is safe to store. This usually means less than 14 per cent moisture. About the only practical manner for a farmer to know the moisture content is to take it to an elevator provided with an authorized tester. This may be an electric or Brown-Duvel oil type of tester. The Toledo Scales Company, Toledo, Ohio, manufactures a moisture tester that uses calcium carbide as a drying agent. It is simple to use on a farm. The cost is about $50.00. Moisture determinations can be made in about 30 minutes. It is important to get a representative sample. Grain or corn stored for some time may have changed in moisture content for vapor or moisture will move from warm to cooler areas. For rough moisture determinations, a 10-pound sample might be dried in an oven where a thermostat will hold the temperature to about 200° F. A 1½-pound loss in weight would mean 15 percent moisture. This method is no more accurate than the accuracy of the scales.

Simple Flues Do The Job

If corn is properly ventilated it will dry out without loss. There are two ways of ventilating corn in the crib: (1) By natural circulation of air. (2) By forced circulation of air.

Engineers conducted a test with flues to ventilate ear corn in an old crib on the farm of L. H. Goddard, near Washington Court House, Ohio. The crib was ten feet wide, which is almost twice normal for that area. It was located in the open about 50 feet from the barn, so that there was free air circulation. The crib was sided vertically with native oak boards. The boards were about five inches wide and spaced to leave ⅝-inch cracks for ventilation. This crib was equipped with special flues, placed horizontally across the crib at intervals of about three feet. The flues provided a special air channel by

THIS INSTALLATION is described as "The Crib of the Future." Two fans serve air into the space beneath the floor, which is slatted to permit the free flow of air to the corn. The walls are air-tight. Below is the opposite end of the crib showing elevator for loading corn. The elevator is fed by an endless cleated belt set into the floor and operated by the same power that drives the elevator.

A CUT-AWAY MODEL showing flue arrangement. No corn should be farther than two feet from air. The model (lower left) shows flue construction and relative size.

AN OLD-STYLE crib rebuilt for forced ventilation. The fan in the small leanto forces air into a shaft in the center of the crib. Lower four feet and end are airtight.

placing two pieces of 2" x 4" timbers about four inches apart with cleats about two feet apart on the top and bottom to hold the pieces in place. The top was covered with ¼-inch mesh hardware cloth to keep the corn out of the flue. This provided a means for the air to enter or escape the flue along either the top or bottom. The flue opened to the outside at one end through a hole cut in the wall. Alternate flues had opposite ends open to the air. Thus, the air could enter one flue, pass through the corn to an adjoining flue and escape through the opposite end. The first tier of flues spaced three feet apart was placed on the floor. The next tier was placed about three feet higher and staggered between the flues on the floor. A third tier was placed about three feet above the second tier. This provided a spacing of flues so that no ear was more than two feet from free moving air in a flue.

This crib was filled with corn husked by hand from standing stalks on September 8, at the same time that part of the field was cut and shocked. The kernels averaged about 33 per cent moisture with a range from 25 to 50 per cent for individual ears. The cobs contained 66 per cent moisture. This is a much higher moisture content than is considered safe for common storage. This corn dried to moisture contents ranging from 14 to 18.5 per cent by October 25. At that time, the moisture content of corn still on the standing stalks and in the shock was about 18 per cent. The weather during that test period was warmer and drier than normal.

The corn dried without molding except at one point where the corn was shoveled into the crib. Here the shelled corn and silks were concentrated enough to prevent free air circulation. This test was under such severe conditions that it showed quite conclusively that wide cribs filled with high moisture content corn can be stored safely and even dried to a safe moisture content by means of simple flues.

To test this method further, a 10-foot-wide metal crib at the Ohio State University Farm was equipped with similar flues. This wide crib, without the flues, had successfully conditioned ear corn containing under 25 per cent moisture. Since the flues have been installed, it has been filled with ear corn picked during the first week of October to permit seeding of winter wheat in the corn field. This corn was of high moisture content. The kernels averaged about 33 per cent with a range from 25 to 45 per cent and the cobs averaged 55 per cent; the over-all average was about 38 per cent. The corn was preserved without mold or heating except where the shelled corn and silks was concentrated under the elevator spout. The second year of the test, about 1,000 pounds of shelled corn was screened out as it mounted the elevator. From the 750 bushels put into the crib there still was enough shelled corn (shelled when ears dropped from the ele-

vator spout) which combined with a concentration of silks restricted ventilation enough to cause some heating and mold at that point. This last year, boards in an inverted V shape were placed directly under the elevator spout to spread the ears to the sides of the crib. Evidently, this has been successful in distributing the silks and shelled corn enough for satisfactory storage. At least, there was no heating in storage as in former years.

This method of crib ventilation has been tried successfully by several Mid-West farmers during the past few years. This should mean a lot to corn producers for it provides a simple and inexpensive method of conditioning ear corn in most any kind of crib, including the common temporary snow-fence type, in which simple flues can be staggered as the corn is unloaded.

The scarcity of material during the war years forced the use of rough sawed lumber for flues. They proved to be very practical. The inverted hog trough type has proven very popular because it is easy to construct and is strong and sturdy enough to carry the load of corn above the flues and also withstand handling. Since only one end of the flue needs to extend to, and be supported by, the outer wall, the other end may be wired temporarily during filling time and then permitted to settle with the corn. This reduces the load which otherwise might break the flue. Wire flues are now on the market.

As an extra insurance against spoilage, shelled corn, weed seeds and trash should be screened out at the crib. Distribution should be more scattered in the crib, and, if possible, silks, husks, moldy and excessively wet ears should be sorted out. This may take time but it will pay in the end.

Corn Drying Principles

The main reason why this type of ventilation is so practical for ear corn ventilation is that, as mentioned before, corn does not dry below about 18 per cent moisture during the months when the temperature rarely gets above 55° F. For areas in the Corn Belt, this means from October to April. Also, since weather changes may be rapid and the farmer has no practical way of knowing its moisture content or vapor pressure, he needs a method that will work under all conditions. The ventilated crib always works. Numerous tests indicate that the temperature of the corn in the crib changes almost as rapidly as the outside temperature, so there is no heating or molding even if the air does bring moisture to the corn. This illustrates another principle that must not be ignored in the ventilation of corn and other grain.

Most dry grain, especially dry corn, will take on moisture from damp air the same way it will lose moisture to dry warm air. Corn may increase in moisture from 15 per cent to 19 per cent in two days. If, however, there is free circulation of air

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POCKETS OF HUSKS, shelled corn, silk, weed seeds and litter prevent the free circulation of air and are focal points for spoilage. Vertical flues aren't enough.

WHEN CORN IS SHOCKED in the field and husked later in the season, spoilage is held to a minimum if it is cribbed at once. A corn shock is a perfect ventilator.

John Keats said, "Some things are for beauty, but venison is also the classic standard by which all other meats are judged."

Deer Park

By PHILIP J. SAVAGE, JR.

MOST PEOPLE regard deer as the most beautiful and graceful of animals. Surely few animals wear a more kingly crown than a full-antlered stag, and nothing moves with more pleasing grace than a doe. It is true that beauty exists in many forms, and the vagaries of human taste find it in even the most grotesque of domestic animals and birds. On the other hand, deer have a natural beauty, apparent to everyone, and as different from that of domestic animals as a fleet winged Pintail differs from a farmyard "puddle duck". This probably explains the age-old fascination men have found in deer, and why the Royal Hart has been the finest of trophies and venison the standard by which all other meats are judged.

In prewar Europe and the British Isles, no country estate was complete without a deer park, shaded by grand old trees, and carefully tended by gardener and gamekeeper alike. This doubtless fostered the common American belief that all deer parks are pretentious and extravagant, and belong only on the lush estates of titled aristocrats or their imitators. Such generalized ideas are hard to dislodge, and it often comes as a surprise to find how easily a park fits into many American farms, and what a really satisfactory form of livestock deer can be. The owner of a large American farm enjoys a standard of living as high as any titled European landowner, and his interests can be as broad. The thousands of hunters who take to the woods every fall prove the existence of a wide and growing interest in wildlife, and doubtless many of them own farms on which there are possibilities for a fine deer park.

If you have a strong interest in wildlife, and particularly in game animals, you have possibly toyed with the idea of keeping a herd of deer on your farm, but have given it up as too expensive and impractical. Perhaps you have even reached the stage of planning the location of a park, but hesitate to proceed further because of the surprising lack of available literature on the subject.

In either case I would advise going ahead with the plans. Far too few Americans are aware of the ease and economy with which a "family size" deer park can be created, maintained and enjoyed. The year-round pleasure we derive from our own has prompted me to offer advice and encouragement to those who would like a small section of natural wilderness on their country place. Deer in a domesticated state are far from being pampered luxuries, and actually require less care and outlay in equipment than is ordinarily provided for sheep, or goats. Few other hobbies offer as much, and demand as little time and attention.

Take a mental trip around your farm, and see if you don't find a few acres that aren't returning their full share of interest, beauty, and to be practical, meat. Most American farms contain at least a few acres of land too stony or hilly for easy cultivation; ground that erodes badly or dries out late in the spring; a mistreated woodlot that grazing has damaged, or a slough with a wide border of higher brushland. All these and a variety of other situations offer excellent possibilities. Many of them, it's true, are utilized as pasture, and therefore cannot be described as waste land, but there are many more that harbor only cottontail

A WOODED AREA with water, the rougher the better, a fence and a feed rack are the simple requirements for a deer park. Neither the barn nor shed are essential.

THIS FAWN, armed by nature with a camouflaged coat, is doing a fade-out among the stones and leaves while the mother feeds. At this age the fawns are easily approached.

rabbits, crows and an old Ford body. It goes without saying, of course, that just because a farm has no waste land doesn't mean it can't have a fine deer park, even though areas unsuited to cultivation are usually more interesting from a naturalist's viewpoint, than broad level stretches of plough-land.

In locating a park, the principle points to consider are natural attractiveness, convenience, size and grazing capacity. The greatest commodity deer have to offer is beauty, so avoid placing them in surroundings which fail to complement that beauty, or that appear artificial. A successful park should enclose a minimum of five acres. Deer increase rapidly, and a park smaller than five acres quickly loses the wild look, which is such a factor in its attractiveness, and becomes merely a large cage retaining some discontented animals. The maximum size is limited only by the land and funds available, but five to twenty acres, properly managed, makes the ideal park. The location should be near enough to the dwelling to be easily enjoyed and also handy to the hay storage to simplify winter feeding where this is necessary. The soil must be capable of supporting a good sod of palatable grasses after brush and weeds disappear. You can't count on the browse provided by shrubs and trees, since a "deer line" quickly appears. In the wild state a concentration of only one deer to thirty-five acres is considered dangerously heavy for browsing. A piece of brushland with scattered large trees is ideal, because the growing herd will yearly provide more feed for itself as the brush is killed and the sun gets through to the ground.

Ample shade in summer is essential, and when the shade trees are of species that produce fruit or nuts, the carrying capacity of the land is definitely increased. Oaks of the White, or annual fruiting type are the best food trees, and hence particularly desirable. Large specimens often produce a really sizable crop of mast, and the deer will make regular trips from tree to tree to clean up every acorn. A park containing several Burr Oak trees is indeed blessed, as the large, sweet acorns, big as the first joint of your thumb, will give the new winter coats a healthy glow and put plenty of fat on every member of the herd. When no large trees are present on the site selected, vigorous saplings should be planted. These will require a deer tight fence around them for several years, just how long depending on species and individual vigor. Guard fences around saplings must be extra strong, or you will notice a stag carrying one around on his antlers some fine autumn day. Deer are devilishly ingenious in the destruction of young trees, and quick to notice any change in the silva of their domain. Twigs and leaves are relished like candy, and a high headed sapling will be walked down and stripped of all tender growth. Eating bark

DEER retain their timidity in captivity, but they can't resist corn and will eat out of your hand. A quick movement will send the herd leaping into the woods.

in winter however, is a sign of malnutrition, and should be quickly checked by increasing the amount of the hay and grain ration. From early September until Christmas, stags delight in polishing their antlers by using a pliant young tree much as boxers use a light punching bag. The tree does not share in the enjoyment at all, and neither will you if you happen to have planted it. It's quite a shock to find a fondly tended oak reduced to something resembling a jointed broomstick in a matter of minutes. Trees of the horse-chestnut, or buckeye group are ideal for deer parks, their inner bark having an odor which renders it unappetizing to deer, and even discourages the stags from rubbing their antlers on it. This fact has long been recognized in European parks, where these splendid flowering trees are widely used.

If the only available site for the park is entirely without trees, the short lived Chinese Elms will provide shade in a hurry if protected for a few years. They are especially useful because of their rough bark and willingness to thrive on dry knolls and ridges. If all other trees fail, try the weedy "Tree of Heaven", *Ailanthus Glandulosa*. It will grow anywhere and thrive mightily even if girdled, bitten, beaten and burned. In fact you can't get rid of it. The only coniferous evergreens that stand a prayer when small are the very spiny types of Juniper such as *var. Stricta* of the Greek Juniper. If your deer will leave them alone, these can be utilized to form excellent windbreaks for winter. Most flowering plants will be ruined, but deer show little appetite for iris foliage, and these colorful perennials can add their beauty to the park.

Poison ivy, poison sumach and stinging nettles are eaten with relish and immunity and the same applies to choke cherry leaves and twigs. I've seen deer stuff themselves with wilted choke cherry leaves from a brushpile, when you could fairly smell the prussic acid, but have never known them to suffer ill effects. Since horses and swine are also unaffected, it may be a question of enzymes or other complex digestive processes. *Kalmia* or Mountain Laurel will poison confined deer if they are starved into eating its unpalatable leaves, but they usually recover. Unless Laurel is very abundant, I would relocate the park rather than destroy that most beautiful of American shrubs. Before turning deer into a new enclosure, on farms east of the Mississippi, it is well to search for such herbaceous species as Dutchman's Breeches, *(Dicentra Cucullaria)*, with its miniature pantaloons, and those two deadly members of the Parsley family, Poison Hemlock *(Conium Maculatum)* and Water Hemlock *(Cicuta Vagans)*. These last two are very rare, particularly unpalatable, and are seldom voluntarily eaten by deer, but they contain such a concentrated resinoid poison,

that small quantities can quickly cause convulsions and death. West of the Mississippi the number of poisonous plants increases greatly and prompts stockmen to be more aware of the toxic weeds in a locality, and how to combat them. All in all you will find deer much more intelligent about what they eat than domestic stock.

A clear running stream is an asset to any farm. Beauty alone, to forget the practical side, makes it desirable. In a deer park a stream, unless very small, can be described as everything from a blessing to an abomination, or from a delight to a catastrophe, depending on the time of year. Having a fair sized stream through our Michigan park, I've run the gamut of these emotions many times. The only fawns that disappeared, and the single adult that ever escaped and was lost, were swept under the fence in flood time. It's easy to build a deer-tight fence across the stream in summer, and the one we finally worked out does better than expected all year around, but when the ice starts out in the spring, or logs come washing down in early summer floods, they can cause quite a bit of worry. A few other considerations besides the two permanently potential escape points, might be disease carried down by infected farm animals upstream, as for example, Liver Flukes in infected snails, and last, but not least, the loss of a large part of the manure that should go back into the land. Depositing the droppings in running water is a habit of all ruminants, probably developed to help confuse their trails. It can result in a considerable drain on the fertility of a park. A stream does have advantages, of course, in providing ample fresh drinking water, and keeping its surroundings green in time of drought. Besides, who can deny the beauty of graceful animals drinking and wading in the riffles. Deer are fastidious drinkers, and their water supply must be clean and constant. A useless seepage can often be dug out and walled in to form a clear spring, and tile lines draining cultivated land sometimes furnish a steady supply of good water. Lacking these, a galvanized stock tank can be partly buried and camouflaged with rocks to make an excellent imitation spring, using water piped from the house or barn. With snow on the ground in freezing weather, deer will do very nicely by eating that, but must be provided with water in the case of a hard freeze unaccompanied by snow.

Of all the world's deer, one species, to my mind, is in a class by itself as the deer for a small park. I refer to the Sika, whose five geographical races are found in Japan, Formosa, north-eastern China, Manchuria and Korea. The typical race inhabits forested areas throughout the islands of Japan, and ekes out what must be a precarious existence in extreme north-east China and Korea. The Formosan Sika differs but slightly from its northern cousins, while the vigorous Manchurian race is five or six inches taller and more robust, with an even denser winter pelage. Two other races, sometimes accorded the distinction of sub-species, complete the group: Dybowski's Sika, from the Ussuri district of Manchuria, and a similar southern form, Cervus Sika Kopschi, of the Yang-tse valley, possibly now extinct in the wild state. These last two are the giants of the family, reaching four feet at the shoulder, and close to three hundred pounds in weight.

In bodily proportions the Sika follow the pattern of the Red or "True" deer, a far flung tribe whose only American representative is the Wapiti. Except for the limitations of size, Sika deer and Wapiti might freely interbreed and produce fertile offspring. This has been proven in certain large English parks, where diminutive Sika stags added Red deer hinds to their harems and from them had handsome fawns. Red deer stags have, in turn, mated successfully with Wapiti cows, and the progeny of all were interfertile. The American Whitetail, Blacktail and Mule deer belong to a different genus altogether, and do not voluntarily hybridize with the true deer. If mating ever did take place, the fawns would almost undoubtedly be "mules", or sterile hybrids.

Be he two feet or four feet at the shoulder, the Sika stag is a lordly beast. There is a thoroughbred look to their compact bodies, and short, neat heads, with large wide-apart eyes set in a finely chiseled, somewhat "dished" face. The best of the Sikas for a small park is the race from Japan and Korea. The larger races are no harder to confine, but to my mind two small deer are more attractive than a single specimen twice their size, and the pasturage required is about the same. A further, and very important point in favor of smallness becomes evident in the rutting season, when stags of the larger type can be downright dangerous, and spoil much of the enjoyment of the park with their truculence. Weighing 150-175 pounds on the hoof, Japanese Sika stags are not dangerous unless they have been tamed as pets. If no effort is made to tame these stags, or feed them from the hand, they will behave at all times. Needless to say, small children should never be allowed in a deer park unaccompanied by adults, any more than they would be allowed in a cow pasture.

Having been semi-domesticated for centuries at Nara and other large parks in Japan, Sika deer caught on at once when liberated in English and Irish parks. One of the first importers of the species was Viscount Powerscourt of Wicklow, Ireland, who secured breeding stock in 1860. In 1879 he wrote, "Japanese deer require no care of any kind. They are as hardy as Red deer, and the venison is even finer flavored. The haunches are of a handy size". In 1884 he wrote, "These pretty little deer are the only (introduced) ones which have multiplied, and have also never required shelter of any

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WILD DEER perish when deep snow covers forage for long periods. They will thrive in a park if given rough feed through the winter and will eat snow in lieu of water.

DEER are nature's champion high jumpers. When surprised or frightened they take off as if jet-propelled. A seven or eight foot fence will hold Sika and Fallow.

THAT ROCKY SLOPE behind the barn won't wash into the feed-lot now that it is covered with a good stand of Christmas trees.

Christmas Trees

Evergreens are a cash Crop for waste Land. Harvest Time comes when other Work is slack.

MANY a person who spent his boyhood in the country can recall a cold, December day when he went into the hills with an older brother to cut the Christmas tree. Maybe only a few evergreens grew in the entire township, and the only one they knew about was a scrawny four-foot cedar gracing a windswept hillside at the back of the farm. It had been discovered the previous summer and carefully guarded until December. It was neither an asset to the farm nor a credit to the plant world, yet for miles around they knew of no other like it.

After the tree was cut it was carried home through the snow. Once in the house it was transformed into a holiday tree of almost legendary beauty. Its dark green branches beneath strings of popcorn and store-bought ornaments blended pleasantly with the soft light of the candles and the open grate fire. Of all the Christmas trees down through the years that was the favorite. It had grown on the home place.

Most of our Christmas trees are shipped down from the northern forests. Each year trains of trucks piled high with baled wild evergreens emerge from the forests and fan out across the country.

Most buyers have to be satisfied with the imported trees, but the home grown trees are preferred for they are generally of higher quality. They have a better shape and color than those that must be cut two months early, and hauled several hundred miles. The preference for home grown trees enables the Midwestern farmer to spend money on his Christmas tree farm and still make a profit by charging more for a better product. His customers are satisfied and return annually. Because of the difference in quality, they are content to pay a higher price for home grown trees. The demand today for high quality home grown evergreens at Christmas time is greater than the supply.

Before you rush to the Post Office to mail your order for seedlings, it's best to decide whether or not you should become a tree

farmer and a lot of this will depend upon your farm. Relax in your easy chair for a few minutes and let your mind wander across your fields; maybe you have some spots of land that would be naturals for evergreen gardens. That eroded hillside that now produces nothing but a good crop of gullies could be salvaged by pine tree plantings. Pines may grow on these tired fields and within six or eight years make them produce a cash crop.

A strip of evergreens around a farm woods, in addition to becoming a cash crop, will protect the soil and become a refuge for wildlife. These should be planted far enough from the forest that the big trees can't shade them. Odd-shaped slopes and field corners that can't be easily farmed are good places to plant Christmas tree seedlings. Not all evergreen plantings have to be big ones. Most fields planted to Christmas trees are less than ten acres, and 10 acres can grow a lot of holiday greenery.

What Soils Are Best?

Almost any soil that is not wet or swampy will raise evergreens. None of the common Christmas trees demand rich soil, and thin or sandy soils will produce good crops. Spruces especially will grow faster on rich soils, but they make better Christmas trees if they grow slowly. Pines and firs do better on poor soils, and acid soils won't discourage them.

Clay soils may heave when they freeze and kill the seedlings. It is best to keep evergreen plantings away from heavy soil. There are plenty of crops that can bring you cash from the good fields. Christmas trees are a crop for the poor fields that aren't fit for general farming.

If you plant evergreens on fields that have been recently cultivated and fertilized, you are often inviting trouble. To keep weeds from choking your seedlings, you will have to continue cultivation or mowing even after your trees are started. The combination of cultivation and fertilizer will make the trees grow fast and develop sparse limbs that can't always be corrected by pruning.

After you have sized up your farm, consider the local markets. There should be a fairly large city within easy trucking distance. If there are two or three large centers within 50 or 75 miles, there should be little question about adequate market, especially if you don't live in a section where pines and spruces grow wild.

What to Plant

Nature has created a long list of evergreens from which you may choose. There are a few, however, which are favorites with the farmers because they have learned that their customers prefer to have these in their homes at Christmas time. In general, a few of the things that customers will look for in their Christmas trees are:

a. A good conical shape.
b. Strong limbs.
c. Healthy green color.
d. Pleasant odor, and
e. The ability to hold needles without shedding them before the day is over.

Two of the most popular Christmas trees in the Midwest are Scotch Pine and Norway Spruce.

SCOTCH PINE is a good seller. It has strong, well formed branches. It has short, stiff needles, gives a compact appearance and holds its needles well in the house. The typical tree farm should grow a predominance of Norway Spruce with Scotch Pine running second. Set about twice as many spruce as pines. Time and experience will likely alter your plantations to give buyers the trees they want in your locality.

NORWAY SPRUCE grows rapidly from relatively inexpensive seedlings. It has dark green needles but loses them sooner in the house than Scotch Pine. Nearly all Midwestern tree farmers depend upon this tree for a large part of their annual harvest.

This doesn't exhaust the list of trees that can be profitable on your farm. As possibilities, you should also consider Blue Spruce, Douglas Fir, Balsam Fir, and White Spruce. Select two or three of these and plant a couple hundred of each to give your plantation the necessary variety.

BALSAM FIR matures to a uniform, symmetrical shape and has the ability to hold its dark green needles well in the house. It has a pleasant fragrance that transplants a bit of the deep woods into the holiday setting. It takes from 10 to 12 years to grow six feet tall, but when it is mature it makes an excellent Christmas tree.

DOUGLAS FIR is a Western mountain species that has invaded the East as a landscaping and holiday tree. It has a better shape and color than the Norway, but may take 12 to 15 years to grow six feet high. If you purchase this species, insist upon stock from the Rocky Mountains, for this is a hardier, more disease-resistant stock than we get from the Pacific Coast.

BLUE SPRUCE is one of the most beautiful evergreens. It is used as a Christmas tree and finds a ready market. It has dense foliage and cool, bluish color that makes it especially attractive to those who buy live trees to reset in their lawns. It is a slow grower and expensive. Tree farmers plant it sparingly.

WHITE SPRUCE has bluish-green needles rather than the dark green ones of the Norway Spruce, but otherwise looks similar to it. This tree, like most spruces, is fairly free from insects and diseases in the Midwest. It has an odor that is sometimes unpleasant in the house but not enough so to rule it out as a Christmas tree.

EVERY SUMMER after the fourth year trim away one-half of that year's growth to give the tree a conical shape. Hands, shears or a sharp knife will do the job.

THE SCOTCH PINE, three years old, in this foresters left hand ranks high as a Christmas tree but the white pine in his right hand is better for erosion control.

RED PINE lacks many of the attributes of the perfect Christmas tree. It grows rapidly, and the widely spaced branches show through the needles. It is sometimes planted but should be only a small part of any plantation.

Don't plant such evergreens as Ponderosa Pine, Jack Pine, Hemlock, and Engleman Spruce unless you are experimenting for your own satisfaction.

Age of Seedlings

You have three choices when choosing the age of seedlings. You can get four-year youngsters that are ready to set right in the field without further worry. If you buy two-year seedlings, they should be nursed along in a replant bed for another two years before they are hardy enough to take up life in the open where they compete with grass, weeds, and frosty weather. Two-year seedlings average about eight inches in height, while four-year trees range anywhere from eight to eighteen inches. Of course, you can start with the seed, as a few tree growers do, but this is a lot of work and waiting, for when the seedlings are two years old they should be reset in the second nursery bed to await their fourth year when they can be moved into the open fields.

Most farmers now go to commercial nurseries for their stock and buy either the two-year seedlings or four-year transplants. They are easier to handle and bring an earlier cash income.

The Replant Bed

The bed you prepare for the two-year seedlings should be in good soil, well drained and fertile. A rich garden soil is suitable for a replant bed. Plant seedlings four to six inches apart in straight rows fourteen inches from each other. Then, with a spade dig a six-inch ditch along the row. In the open trench plant the trees with their roots a little deeper than they were in the original bed. Draw soil enough around the roots to hold the tree upright. Then sink the spade into the earth five inches from the row and pull it toward the trees to force the soil around them. Finish filling the trench with a garden rake and tramp the earth well by straddling the row of trees and stamping along it.

Soil left loose around the roots of seedlings will cause casualties. Try to lift one from the ground; if it comes up easily, it wasn't well planted.

During the next two years, give the young trees in the replant bed every chance to make good. If you cultivate them during the summer, stop this operation by the first of August. This gives the grasses a chance to start again before winter sets in. The grass will protect seedlings during winter months when freezing makes heavy soils heave.

Keep the replant bed free of weeds that would otherwise share the soil nutrients. During cold weather a three-inch mulch

TWO PEOPLE CAN plant about 1,500 four-year seedlings a day. Dig a hole and set trees firmly. Keep roots immersed in water until they are in the ground.

ENEMIES OF Christmas trees are hardwoods, briars and wild shrubbery that invade the planting and compete with the evergreens for light and moisture. Hardwoods seedlings should be grubbed out once a year or your plantation will soon become a woodlot.

of leaves or straw should be applied after the first autumn frost and removed again when spring weather returns.

The Final Planting

Like driving a Model T, most of the labor on a Christmas tree farm is in getting the crop started. Once four-year seedlings have their roots in the ground, they need but little care.

Clear the brush and briars from the field to be planted. Rough growth will give the trees too much competition. Briars are one of the worst pests that the Christmas tree farmer has to contend with and it's usually a constant battle to control them. Some tree farmers plow their fields. Usually this isn't necessary, and on sloping ground it can be dangerous to take the chance with erosion. The added results from plowing a field for evergreens seldom balance the cost and dangers from erosion.

The time to plant seedlings is in the spring right after the ground is frost free but while it still holds plenty of water. Fall planting can be successful only if there is plenty of moisture in the ground. It's best to play safe and do your planting in the spring.

Unless you plan to cultivate your trees, it doesn't matter whether you check row them or plant them at random. If you want to get as many trees as possible in the field and still keep them at the correct interval, check row them. On sloping fields it is best to plant on the contour to protect the soil, and make the crop easier to work with. Make a plan for each field that you expect to plant, and with this bit of planning you can tell how the rows should run to make that field support the most trees. When check rowing your field, lay the rows out four feet apart. This interval will allow you to plant 2,720 trees to the acre. To protect their lower branches, Norway Spruce should be planted at five-foot intervals, which will allow 1,740 trees to the acre. It's hard to check row where there are deep gullies. Here the pines will have to be spotted in.

There is no secret to planting an evergreen. It is a matter of digging a hole big enough for the roots and setting the roots firmly in that hole. A mattock is a good tool for the planter to carry and usually is the sole implement he needs. After the hole is dug, set the tree in and spread some of the loose, moist soil around the roots. Pack the soil as you pull some of the coarser in on it until the hole is filled. Tramp firmly to force the soil around the small roots.

A simpler way to plant is to use a spade which you sink into the ground and make a wedge-shaped hole by pulling the handle back and forth a few times. Put the plant in this hole and firmly tramp it with your heel. Spruce seedlings should be set no deeper than they were in the replant bed. Pines and firs should be planted slightly deeper.

Never let the roots of seedlings dry out

JUST BEFORE CHRISTMAS salable trees are sawed down, packed loosely on trucks, and hauled to markets in nearby cities. Most of them are about 10 years old.

while they are out of the ground. Seedlings that are awaiting their turn should be carried in a pail and their roots covered with mud or water. If you have to keep your stock a few days before you can get it planted, heel it in and keep it well watered.

The cost of planting will be determined to a big extent by the cost of labor in your locality. One man can plant from 500 to 1,000 seedlings a day. If you are making a large enough planting that you have to hire labor, plan to organize your men in crews for efficiency. In a two-man crew the first can dig the holes and the second complete the planting.

Here is a bit of good news; you can save the commercial fertilizer for the corn field. Fertilizing evergreen trees is an expense seldom justified by the results. Once in a while you may find sickly trees in your plantings. These can usually be nursed back to health with barnyard manure. One Illinois Christmas tree farmer has found that he can give a yellowing tree a new grip on life by applying a couple of handfuls of poultry dropping around its roots.

The men who grow the kind of Christmas trees that city people like to take home aim for beautiful plants that are evenly branched all around with strong, colorful limbs, an aristocrat among trees. A farmer would have to be part magician if all of his trees grew up to meet these standards of perfection, but those that don't make the grade are still valuable. If the tree with the poor shape is caught young in life, it can be trimmed to a conical shape and made to grow up with a good figure. All of your Christmas trees should be pruned once a year after they are set in the open fields. This keeps them from growing tall and clumsy.

Pruning isn't one of your early worries, however, for it shouldn't be tackled until the tree is four years old. Then, during June or July, prune back one-half of that year's tender new growth which you can recognize by its lighter color. When branches are pruned, new buds form and give rise to new limbs, filling out the tree to the desired shape. One man with a pair of shears can trim 50 trees an hour. Young growth is tender, however, and can be snapped off with the fingers. A tree that gets the proper care when young should, by market time, please even Santa Claus.

Protect the Plantation

Livestock and young evergreens don't mix. Fences to keep them separated eventually pay for themselves. Wild deer are a different matter, for they exercise their legs by jumping fences and their jaws on evergreens. Farmers in deer country should consider this factor in their original plans.

A grass fire can ruin the plantation. The best fire control is prevention. Keep the field free of weeds and brush. If desired, fire insurance can be bought for trees, but the cost is prohibitive. Actually, the danger from fire is slim when proper precautions are taken around the plantation.

One enemy that the Midwestern tree farmer will run up against is hardwood trees that invade the plantings. This will be a constant battle in most localities, for surrounding woods supply the seed, while birds and wind move it in. This succession from pines to hardwoods is logical in nature's scheme, and where the field is to be kept in Christmas trees on a permanent basis, the hardwood seedlings will have to be grubbed out once a year.

Comes the Harvest

After your trees begin to mature, you wait anxiously for the month of December when you begin to look at your plantations with dollar signs in your eyes. Go through the fields and decide which trees will be harvested. Cut only those that deserve it. The majority of them will be cut at about seven or eight feet in height, but because customers are different, you must harvest trees of all sizes, from two feet up. You generally make more for your investment on the trees you sell small for table trees. You are better off to take

75 cents for a three-foot tree than wait another five years to sell it for twice that amount. The biggest demand, however, is for trees five to eight feet tall.

Some customers prefer to come right to the field and choose their holiday tree before it is cut. After they have made their choice, the farmer cuts the tree and helps them tie it on their car. Or, he tags it with their name and delivers it just before Christmas. He is willing to go to the extra trouble, but he gets paid for it. These trees, if of good size, should bring from three to five dollars.

Use strong hedge clippers to cut the smaller ones and a hand saw for the larger ones. Cut the tree a couple of inches from the ground and cut it squarely to save the customer the trouble of retrimming it.

The highest prices are obtained for trees sold complete with roots and balled and wrapped. When digging a tree, take care to keep the soil compact around the roots. The tree must be liberally watered and replanted as soon as possible after it serves its purpose as a Christmas tree. A wrapping of burlap around the ball of earth is necessary to hold the soil in place. This is known among tree farmers as "balling and burlapping." It, of course, involves extra labor which goes into the selling price.

Howard Cowran, a Northern Ohio farmer, has made Christmas trees one of his primary crops. He sells about 3,000 trees a season, and with the help of his brother retails most of them in nearby cities. Other farmers living along well traveled highways erect stands in their front yards and sell trees fresh from the patch. Doing your own marketing is extra work, but it comes at a season when other farm duties aren't pressing you for time. By doing the selling, you can realize the salesman's profit as well as the grower's.

There is an easier way out for the farmer who prefers not to do his own marketing. You can usually contact a wholesale dealer who will come into your fields and haul out the trees you want to market. The dealer may do the actual harvesting, but if he does, play safe and select the ones you want cut. Before he gets to your farm, go through the plantation and plainly tag those that are ready for harvest.

Sell the Greens

The cull trees that you hesitate to sell need not go to waste. They can be salvaged and sold as greens. During the holiday season, these are bought by housewives who like to see them hanging from mantles or picture frames. Limbs are bundled in 20-pound lots and wholesale at a dollar a bundle. Most farmers make greens a profitable sideline. One Ohio tree farmer has planted Mugho Pine especially for greens. Mugho is a bushy, low growing pine from southern Europe. It has heavy, dark green branches, and where it is trimmed, a whole family of new buds appear.

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TWO YEAR TRANSPLANTS are set in rows in well tended beds until they are four years old. This plantation is part of the Musser Nursery at Indiana, Pa.

SOME FARMERS fertilize their trees one year before harvest to give them a better color. Generally speaking the added returns seldom justify the cost.

CHICK SEXOR Mrs. Ruby Sebree, McLeansboro, Illinois, farm matron, sexes 1,100 chicks an hour with 95 per cent accuracy. She took a six-weeks course and rehearsed for six months before starting commercial sexing twelve years ago. Working at high speeds, Mrs. Sebree keeps the air full of chicks.

Chick Sexing

BY JOHN H. LUNN

Americans have learned the Oriental art of sexing chicks. By disposing of unprofitable male chicks the egg industry has increased its margins.

IN THE days of Moses there came from Pharaoh, the King, an order that changed the course of humanity and shocked the world.

"And Pharaoh charged all his people, saying, 'Every son that is born ye shall cast into the river, and every daughter ye shall save alive.' " Exodus II 1-2.

In 1933 history repeated itself when the Orient gave us a less tragic version of the destruction of male offspring in the story of chick sexing. Every cockerel was to be picked out and disposed of as a day-old chick, picking the sons from the daughters, the males cast into the river, and the daughters saved alive. How was this to be done, and why? Anybody who had ever hatched a chick knew you couldn't tell male from female until the cockerel began to "make comb." But the clever Oriental, it was said, had found a way to determine the sex of a day-old chick. Why the day-old chicks were to be sexed was an easier question to answer.

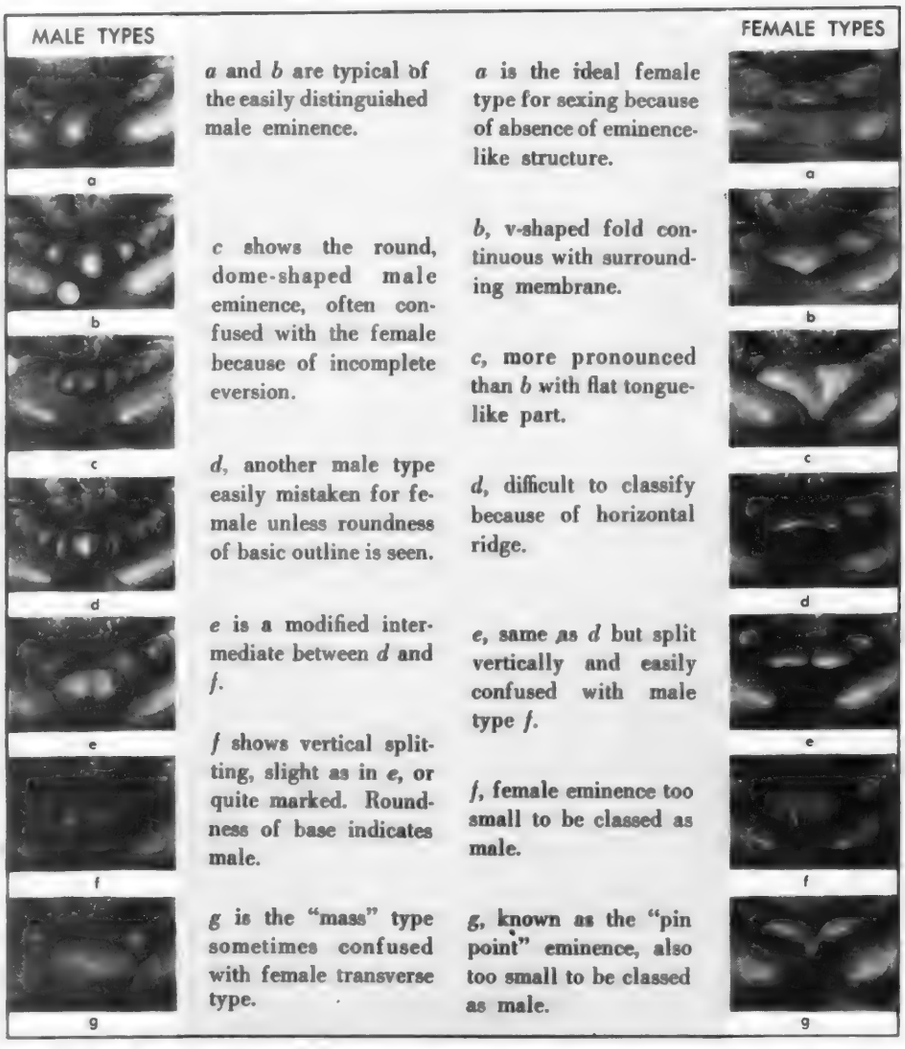
With the depression at its lowest ebb in the early 1930's, conditions demanded more and more economy and efficiency of production. One of America's big businesses, that of producing eggs and raising chickens, was faced with a large and important question: What to do with the Leghorn cockerel? He was almost valueless, took up needed space in the brooder house, crowding the pullets away from feed and water. Poultrymen were losing money raising them and something had to be done. On the Pacific Coast, where the single-comb White Leghorn still reigns as the best laying strain, chicken people had to make a move to save their industry. Egg producers who bought chicks wanted pullets only, and hatcheries were always swamped with unwanted cockerels. Some of them had heard of the practice of chick sexing, developed in the Orient. This new technique of accurately picking the sex of the day-old chick sounded like one of the mysteries of the Orient, like standing an egg on end at the Equinox. Maybe here was the answer to save their industry, to rid themselves of the useless Leghorn cockerel.

It was with this in mind that the poultry leaders on the Pacific Coast met with Professor E. A. Lloyd, head of the Poultry Department at the University of British Columbia, in the spring of 1934. These far-sighted poultrymen asked K. Masui and J. Hashimoto of the Imperial Japanese University at Tokyo, and the Japanese Department of Agriculture, to divulge the secret of sexing day-old chicks.

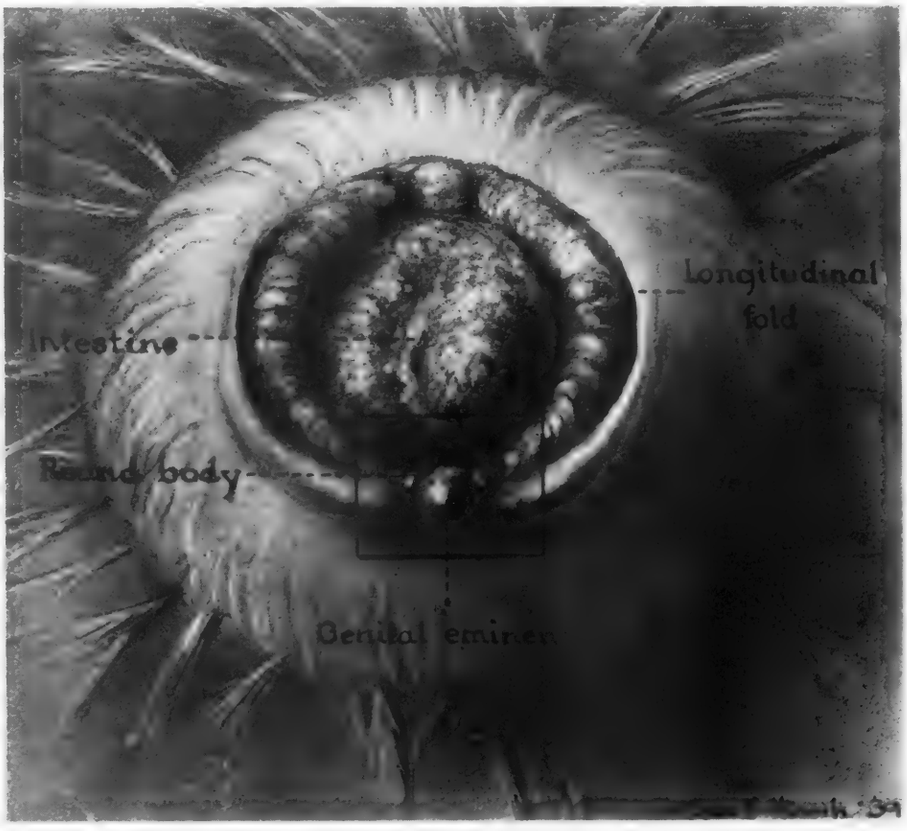
This was the beginning of a new era for poultrymen. The first demonstrations were held at the University in Vancouver, British Columbia, with two more following in the United States at the Kent Hatchery, Kent, Washington, and the Bellingham Hatchery of the Washington Cooperative Chick Association at Bellingham, Washington.

The American and Canadian investigators were astounded at the accuracy of the Japanese sexors. Five young Japanese were sent over to demonstrate this new technique for the first time on the North American continent, one of the rare acts of reciprocity for our steel scrap. Their names were hard to pronounce, their speech still harder to understand, but their nimble fingers were those of experts who knew their business. Five students, Hikosoboro Yogo, "Dick" Kozuo Kubota, "Con" Kichitore Kondo, "Jim" Tadao Yamamoto, and "Harry" Rukichi Aihala were selected to represent the 1400 chick sexors in Japan. They gave an amazing demonstration. However, if it hadn't been for a Canadian-born Japanese, Harry Nakanobu, a graduate of the University of British Columbia, who acted as interpreter, this new development might have died then and there through the inability of the Japanese to explain in English how they accomplished the sexing technique.

STUDENT SEXORS use culls until they have developed the sure but gentle grasp which does not injure the chick but permits speed. This is the "hold" taught by one school.


MALE TYPES
FEMALE TYPES
a and b are typical of the easily distinguished male eminence.
a is the ideal female type for sexing because of absence of eminence-like structure.
c shows the round, dome-shaped male eminence, often confused with the female because of incomplete eversion.
b, v-shaped fold continuous with surrounding membrane.
c, more pronounced than b with flat tongue-like part.
d, another male type easily mistaken for female unless roundness of basic outline is seen.
d, difficult to classify because of horizontal ridge.
e is a modified intermediate between d and f.
e, same as d but split vertically and easily confused with male type f.
f shows vertical splitting, slight as in e, or quite marked. Roundness of base indicates male.
f, female eminence too small to be classed as male.
g is the "mass" type sometimes confused with female transverse type.
g, known as the "pin point" eminence, also too small to be classed as male.
a
b
c
d
e
f
g

A SHARP, EDUCATED EYE is needed to catch the fine differences between the male and female types. A sexor makes decisions at the rate of one every three seconds.



THIS IS THE EVERTED CLOACA. Both male and female have the eminence. It is the sexor's job to distinguish between the male and female types, sometimes a toss-up.

Yogo, during the demonstration, reached a speed of 1400 chicks an hour with an accuracy of 98%. This speed has been equaled since by Americans, but not until they had gained many years of experience. The five Japanese returned to Japan at the end of the season.

The first schools to teach Americans the trick were set up in the cities of Kent and Bellingham, Washington. The task often seemed impossible to those who first attempted the job. It was easy to become 85% to 93% accurate, but the Americans and Canadians were determined to equal the 97% to 99% accuracy of their Japanese associates. Dr. Morley Jull, then U. S. Poultry Husbandman at Beltsville, Maryland, and his associates took up the immense job of training young Americans to be chick sexors. American-born Japanese were sent to Japan to take four to five months training courses under Japanese sexors and teachers.

The demand for chick sexors was far greater than the supply. Many entered the field who were undertrained and lacked experience and accuracy. The infant craft developed a black eye from which it slowly recovered. Sexors who had taken extensive training in Japan established schools in the United States. The first such school where students were trained and made ready for immediate commercial work was founded in 1937 by John S. Nitta. Nitta was one of the pioneer students in chick sexing, attending a training school in Nagoya, Japan. He worked in hatcheries and on poultry farms in Nagoya, pursuing his studies under expert sexors. Possessed of the lore and secrets of the Japanese, Nitta returned to the States to found a school.

At Nitta's school at Lansdale, Pennsylvania, students receive a six-week fundamental course which costs them $75.00 per week tuition. This course is followed by a proficiency course for another six weeks at $75.00 a week tuition. Students use day-old chicks which they pay for themselves. To obtain certificates, students must sex 200 chicks in 25 minutes with an accuracy of 95% or better.

A slow sexor will turn 100 chicks in 15 minutes; a fast one will turn out the same number in four minutes. Earnings range from $4.00 to $12.00 an hour. The usual fee of the chick sexor is a cent a chick, although the larger hatcheries have the plan whereby they pay ½c each and the chick sexor works for them exclusively drawing a minimum guaranteed yearly salary. The work is seasonal except in areas where chicks are hatched the year round. Earnings during the season of three or four months range from $3,500.00 to $6,000.00. The employment agency usually demands a percentage of the earnings. Most sexors

have other jobs for the remainder of the year. According to the International Baby Chick Association, there are less than 1,000 sexors in the country.

In addition to the sexor, large hatcheries employ a "swamper" who feeds chicks to the sexor, counts and boxes the chicks after sexing and keeps the operation moving.

The graduates of Nitta's school are as modern as their job and are organized as the American Chick Sexing Association which operates throughout the United States, Cuba, and Mexico. Although Nitta does not guarantee jobs for his graduates, he has never failed to provide employment. Most sexors are affiliated with an employment association, such as Tel-Sex, Springfield, Ohio, and the A. C. S. Association, which arranges employment for their members. On the West Coast Japanese-Americans predominate.

At this same time, soon after Nitta started his school, others were taking up chick sexing. Chester Pilch set up a school in New England at Hazardville, Connecticut, in 1939. Pilch, a young fellow still under 40, has through his income from sexing and his careful management developed a modern breeding farm of 14,000 Pullorum-clean breeders. Others have purchased hatcheries from their earnings. Some have taught members of their families the technique.

Mrs. Ruby Sebree has been sexing chicks for twelve years. She went to a training school for three weeks and followed this by practice sessions of one day a week for six months. She used cull chicks in the practice sessions and killed a good many before she learned to handle them. Accuracy came first, then speed. She learned first how to pick up the chick, how to hold it and open the vent, and how to determine the fine differences of sex. When she had reached 95 per cent accuracy, she was assigned a territory and went to work. She has been checked out at a rate of 1,100 per hour and averages 95 per cent accuracy and 800 to 900 an hour on a straight run. Her best year was in 1945, out in Kansas, when she sexed 500,000 chicks in four months at a cent-and-a-quarter per chick. She knows about 40 sexors personally, of which 18 are women. She is employed by the Tel-Sex Company, of Springfield, Ohio, which arranges her schedule for the four-month season. Mrs. Sebree has no direct business dealings with the hatchery, Tel-Sex acting as her agent, receiving 25 per cent of her earnings.

Mrs. Sebree and her husband, who is also a sexor, own a 60-acre farm at McLeansboro, Illinois. They live there when not on the road. This photograph was taken at the Kegler Poultry Farm, Romeo, Michigan.

Katherine Uyeno works for hatcheries in and around Holland, Mich. Her brother, Y. Sugiura, was one of the first

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THERE ARE DIFFERENT SCHOOLS of thought about how best to open the vent for inspection. In the vernacular of the trade the methods are known as the "push" form, the "pluck" form and the "pull" form, and each has variations. The purpose of all forms is to evert the cloaca so that it can be easily inspected.

Autumn

A collection of bright leaves from fall's congenial days.

The tired year, done with her labor of bough and field,
puts on her brightest frock for a last fling;
under her approving skies man gathers and stores
her harvests for the long winter ahead.

"Chicken's mighty good fried in corn meal"

Apple Butter

THE good farm housewife spurns boughten apple butter as an inferior product and prefers to make her own. Apple butter making is an event on the farm, approached with elaborate preparations, something like a family reunion or a wedding.

There's a great deal more to making apple butter than the cook books will tell you. Theirs is a dry mathematical formula, and while butter of a sort can be made by following the recipes, the superior product takes a know-how which cannot be bound into the pages of a book.

Here's the way that Nora Weaver, of Belle Hollow, Tennessee, goes about making her famous apple butter. Mrs. Weaver, called Aunt Nora by all the children in the community begins on her husband, Ben. On a fall morning, just before the first frost, Ben hitches the team to a bed wagon and with all the kids he can gather up in the neighborhood, drives to the orchard, stopping under each tree. The fallen apples are loaded into the wagon and the kids and Mr. Weaver ride over to the Belle Hollow cider press. The apples are crushed and pressed, and after Mr. Adams, the cider press man, has taken out his toll, the barrel of cider is hauled back to the farm. All the kids, of course, are so full of cider you could crack a tick on their tight bellies.

The barrel is rolled up to the kitchen door and set up on a couple of saw horses. A spigot is driven into the barrel and Aunt Nora draws off a bucketfull of the fragrant juice. She has already set up the copper kettle in the yard and has a brisk fire going under it. The kettle must be copper. This is very important. An iron kettle will not do, for the apples will dissolve off the iron and the butter will taste of it. The copper kettle should be first washed with salt and vinegar.

The kettle is filled with cider and the boiling begins. The cider is boiled down to about half its volume, or until it is about the consistency of thin molasses. This is set aside in a cool place until the next day. No experienced apple butter maker would think of telescoping the delicate operations of butter making into one day.

While the cider is boiling, being stirred constantly by Aunt Nora's youngest son,

(Continued on page 99)

The Turkeys Are Fat

When the goldenrod is blooming along the pasture fences turkey raisers are putting the finishing touches on their holiday birds. If it has been a good year for the flock the birds are nearing an average of 20 pounds each at six months of age.

On farms where the total turkey population numbers around a dozen birds chances are that they have never known the comforts of a warm brooder house. The old hen likely hid her nest in the woods when winter snows were just melting from warm spring winds. She didn't show up in the barnyard again until she had a brood of youngsters to show off.

Where turkeys are kept as a business, however, they got all the care of any other high-priced investment. They spent the first 12 weeks of their lives in brooder houses and wire-floored cages, where the table was spread with choice chick feed mixed to add weight fast and keep young turkeys healthy. Then they were turned out on the range.

In tobacco sections of the country, farmers use them to control pests. When a large flock of half grown turks are turned loose on a tobacco field, they eat the big tobacco worms and will not do serious damage to the plants.

In the mid-west, where oat farmers have been bothered by grasshopper scourges, some of them have taken to raising turkeys. When grasshoppers are ready to take over the oats, the one-week old turkeys are released in the oat field to feed on the pests. The oats "come back" from the trampling the turks give them with much less damage than they would have suffered if the grasshoppers had been left to feast at leisure.

Twenty-five years ago, blackhead drove turkeys west of the Mississippi where land was not contaminated with blackhead organisms. As farmers learned to spot the sulphur colored loose droppings of a diseased bird, and see from its walk and posture that blackhead was attacking it, and either kill or isolate the bird, blackhead came under control. Rotation of range grounds was a big help and today there are about ten million turkeys in the country. Most of them will be white meat and drumsticks in a few weeks.

THE GOLDENROD which brightens our countryside in autumn is planted extensively in European and English gardens where in combination with Michaelmass daisies or fall asters it makes a popular back border. Goldenrod had the name for causing "hay fever" and, until the hex was put on ragweed for this allergy, people dug up goldenrod wherever they found it. To farmers who have been fighting it all their lives, it comes as something of a shock that other people have been harvesting it. The leaf has a medicinal use both as a laxative and as an aid in human kidney disturbances. But in grandmother's day, the leaf had a more delightful meaning: if you wore a leaf of goldenrod you would see your lover on the following day.

THE FIRST PROBLEM is to decide whether the old tree is worth saving; sentiment counts heavily in the decision.

Saving OLD FRUIT TREES

The third article for fruit growers by FRANK H. BEACH

REJUVENATING old fruit trees is not too difficult once you have answered the question, "Is the tree worth saving?" The commercial orchard man usually uses a bulldozer for his rejuvenating work, and as soon as the tree is removed and burned he will plant a young tree as a replacement. He can't afford to take the time nor spend the money on materials needed to put old trees back in shape; they may never again bear enough fruit to make it worth-while.

But an old fruit tree in the yard near the farm house has value far beyond its ability to produce fruit profitably. There are memories of boys "skinning the cat" on the low limbs, and little girls climbing up to leafy tree houses where they can write secrets in their diaries. Perhaps it is a Greening or an Early Transparent from which the first apple pie of the season is made; apples from the old friend in the side yard seem to taste better. The cool shade under its beautiful, gnarled branches is an ideal place for settees and easy chairs. Here a summer romance or a plan for the week's field work just naturally develops easier. Usually nature with a wrathful summer storm is the only logical end to the old apple tree's useful life. And so for most people, rejuvenating old trees becomes a worth-while and sentimental undertaking.

The apple tree shown being repaired on the following pages is an old family favorite, the Winter Rambo. The work required to bring it back to health is time-consuming, but it can be spread over several seasons of the year. The best season to rejuvenate old trees is in the spring. Pruning, spraying, and fertilizing should be done then. The cavity chiseling and painting, and the limb bracing can be done at this time, or in the summer or fall. In any case, the cavities should be well dried out before the asphalt paint is applied.

Given reasonable care after a thorough rejuvenation, an old apple tree may live to be a hundred years old or more, which is equal to the life span of many of our best shade trees. It may contribute several bushels of apples yearly to the family larder.

THE LARGE CHUNK of dead wood being removed from the tree was a fine home for termites, but bad for the tree. This tree has a number of running cavities that must be cleaned out and cut down to solid, live wood. This work can be done almost any season of the year, except in wet weather.

EVERY OLD TREE retells the experiences of its youth. Years ago a third branch grew out of the crotch of this tree. The farmer didn't have the right tool with him to cut the branch back so he chopped it out roughly with an ax. The stub died back and decayed. Now it must be removed and the lower extremity brought to a point to promote proper healing.

STRAIGHT CHISELS are useful for finishing edges of cavities; the gouge chisels are for cleaning out cavity debris and dressing the surface of the cavity. All of the cavities are brought to a point at the top and bottom. The edges of the cavities are trimmed back until the bark shows life. Although easier to make, a sloping cut edge will not heal rapidly. All edges should be cut so that they are at right angles to the bark. The completed cavity cut should allow the water to drain out at the bottom.

A TRIANGULAR SCRAPER or any thin, sharp piece of metal is used to scrape off all the loose outer bark from the tree trunk and the larger branches. This will permit a more thorough application of the dormant spray to control San Jose and other scales, eggs of aphis, red mite and insect pests. After completing the job it is best to collect and burn the scrapings.

WHILE THE PRODUCTION of an old tree may never equal a young one, the fruit has fine flavor, and there is satisfaction in picking it.

THIS OLD TREE needs bracing. Sharp crotches and cavities have weakened it. A triangular brace will be installed, which will give it good bracing against heavy winds and ice storms. Holes are bored for the installation of large screw eyes.

SCREW EYES are placed at the same height on the three limbs held by the triangular brace. A cable is threaded through them, drawn taut, clamped and tightened with a turnbuckle. Braces should be installed before fruit has spread the branches.

ALL THE CAVITIES are painted with asphalt tree cavity compound. Filling the cavity with cement after painting makes a neater job, but it does not permit inspection and retreatment at a later date, if more decay shows up in the treated area.

THE POLE PRUNER is a good tool for working on old trees. Branches too tall to spray or harvest are cut back to outward growing branches at a desirable height. Underhanging weak wood is pruned away from each fruiting limb.

THIS IS a typical branch needing extensive pruning. The idea here is to open up the dense tangle of branches. All watersprouts, dead and weak underhanging wood will be cut away to bring in light around the best wood, making effective spraying possible.

SAME BRANCH AFTER PRUNING. Only the best placed and most vigorous branches have been retained. All cuts have been made snugly to promote fast healing. Each large branch on the whole tree should be given the same thorough treatment.

THE LONG AND SHORT of the tree fertilizing story is to get an even coverage from the tree trunk out to a yard beyond the area covered by the spread of the branches. Fertilizer is usually applied in the early spring, but may also be spread after leaves drop in the fall. A rough guide for quantity is to measure the trunk of the tree about a foot above the ground. If it is say, 10 inches in trunk diameter, apply about 10 pounds of a high nitrogen content complete fertilizer, such as 10-6-4. If a higher analysis straight nitrogen fertilizer is used, like Nitrate of Soda or Sulphate of Ammonia, apply about half the quantity. It should be watered in at once to avoid grass burns.

CLEAN FRUIT can be produced on an old tree just as easily as on a young one. Follow the spray recommendations for your locality, which can be supplied by your county agent. A long-pipe hand sprayer like the Paragon in use here, will reach even the high branches, and do a good job.

LARGE PRUNING CUTS, of 2 inches and over in diameter, are protected while healing with a pruning paint. Here the dressing on a previous year's wound is being renewed. At belt height on the same branch can be seen the advanced healing of a large and properly made snug cut.

Farming with the Tuttles

JUD TUTTLE and his wife Melia, live in a right nice place on Salt Lick where the creek cuts through the ridge. They have three rooms with a porch in front and a sand bottom spring at the foot of the hill. Jud's farm equipment is simple but complete. He has a six-inch breaking plow, a spike-tooth harrow, a one-shovel corn plow, a dun-colored mare mule, Goldie, and a spotted hound, Spatter. Melia has a good stove and a young cow and in the summertime there's always a lot of flowers blooming about the yard.

Jud and Melia raised a parcel of kids, but what hadn't married and settled away are in the city working. Melia doesn't get lonesome for it takes a lot of scratchin' to make ends meet and keep sugar and coffee in the house. But Jud misses the younguns, specially when the corn needs hoeing.

In his spare time, and with the help of the reluctant Goldie, Jud works eight acres of hillside. When the sky is spotted with little white clouds and there's just the trace of a wind-blown ripple on the pools, Jud fishes in Salt Lick. After the first frost, Jud's gimlet-eyed marksmanship and Spatter's busy nose bring many a fat young possum to simmer with a mess of turnip greens in the pot on the back of the kitchen stove. Melia tosses a wide bay leaf in the pot to kill the fish taste.

Seven years ago Salt Lick came up a-boomin' one March night and took out Jud's acre of bottom. Ever since, he's been working on a piece of new ground. Last

winter he got enough dynamite to blast out a few of the bigger stumps; he burned out some dead snags and grubbed out a lot of the second growth that had come up. He used Goldie to snake out small stumps that had rotted down.

Getting the new ground in shape was a job of urgent necessity this spring, for Jud's potato barrel has been empty since early in February and Goldie forgot a long time ago how an ear of corn tasted. Melia snapped at Jud when he complained that he was getting all-fired tired of sowbelly and beans, nagged him about the new ground, and called him a lazy good-for-nothing.

This morning Jud had got up bright and early, about five o'clock, silent and resolute. He was going to plow that new ground today, come hell or high water, and he wasn't taking no nonsense from nobody. He threw on Goldie's patched harness, and hitched her to the plow. When he got back to the strip of new ground he leaned on the plow for a moment to survey the discouraging layout.

"I'll never get through it," he said to himself.

He decided to start on the west side, where it looked a little cleaner. Goldie hadn't gone a rod, straining and grunting and flailing her ears, when the share struck a submerged root; the point stuck firmly, and with the perversity of her kind, Goldie at that moment elected to put on an extra burst of speed. The plow handles shot upward and Jud, caught off guard, went heavenward.

He swore eloquently, picked himself up and wiggled the plow out of the furrow and set it down ahead of the offending root.

A dozen times, before he had made one round of the piece, he had trouble. Twice Goldie broke a trace and he went back to the house for a piece of baling wire to mend it.

He finished the first round and sat down on the plow to survey his work. The virgin earth, enriched by a thousand years of rotting leaves and decaying trees, turned up black and promising. He stooped down and wadded a handful in his fist.

As he opened his palm the earth fell apart and there, plump and lively, was the biggest fish worm he had ever seen.

He looked at the sky, felt the soft spring breeze on his cheek and perspiring brow. The battle of the new ground hung in the balance. Jud put up a good fight, but the spring breeze won out. The plowing could wait until tomorrow. The ground would be in better shape, anyhow.

Jud found an old can and started back along the furrow. As he gathered the fat worms he thought of Melia. There'd likely be trouble there.

He went back to the house, carrying the can of worms behind him. Melia was cooking up a mess of soap in a kettle in the yard. Jud sat down on the wood pile.

"Melia, I ain't never seen the like of them stump roots in that clearing. By grannies, every time I set the plow in I'm throw'd every which way."

Melia gave him a sharp glance full of the native wisdom of a mountain woman.

"You got worms in that can?" she asked, knowing right well that he had.

Jud ignored the question.

"Melia, a man could get hurt bad plowing that new ground."

"Jud Tuttle, it's been nigh onto seven years since you started on that clearing. Now you git right back there and quit gawkin' into that can of worms."

Melia's words were plain evidence of what she wished, but the tone of her voice showed that she knew Jud was far away.

"Why, Melia, you wouldn't want me to git hurt would you? If I could go down the crick a spell and do a little thinkin', I might figger out a way to git that plowing done without breakin' a leg. Anyhow, Goldie's tired out. And besides," he added with the enthusiasm of a man who sees his logic accepted, "I mighten catch us a mess of catfish for supper."

Melia poured another can of lye into the kettle and sighed. "Git out of my sight, Jud Tuttle. Go pick your gittar or go fishin', but git off that wood pile. You can't help me none with this soap and I don't want you gittin under my feet."

Jud knew a victory when he saw one. He also knew it was only temporary, but he'd got a reprieve, and he wasn't waiting around. Unwinding his legs, he got up from the wood pile, took his fishing pole off the nails on the back porch, and disappeared over the ridge in the direction of Salt Lick. Spatter crawled out from his nest under the porch and followed. Goldie, tied to the fence, brayed lustily. Jud stopped, then went on. "Danged if a man couldn't git kilt back there in that new ground," he said, and by this time he believed it.

BROMEGRASS

BY ROBERT R. JOHNSON

"Bromegrass puts a lot of hair in the plaster."

That observation was made by an Iowa farmer who was looking at a field of freshly-turned brome sod. What he saw resembled nothing so much as a good grade of plaster chock full of hair. That partly accounts for the growing popularity of bromegrass, a pasture and hay crop that produces an amazing root system, good hay, and excellent forage.

Since time immemorial brome has been a staple hay and pasture crop in Europe and Asia. It was brought to the United States about fifty years ago, but for most of that time it has remained an unnoticed wall-flower. Recently, however, farmers have discovered its many quiet and sound virtues and it is now being invited to most of the pasture parties on American farms.

From scattered plantings a decade ago the acreage of bromegrass has zoomed past the million mark and is increasing. The seed demand is often greater than the supply.

Strictly Historical

A native of Europe and Asia, bromegrass was introduced into this country in 1884 from Hungary and Russia by the United States Department of Agriculture as part of an extensive range improvement program. Dr. P. B. Kennedy of the USDA took an active part in the development of the grass after its importation by the California Agricultural Experiment Station. Seed was distributed to experiment stations in Colorado, Minnesota, North and South Dakota, from where bromegrass spread to other areas.

At the time of World War I, when hungry millions were shouting for bread, thousands of acres of grasslands were turned to grain and brome faded almost entirely from the picture. When scattered old stands of bromegrass survived the drought of the middle 30's, while other grasses disappeared, the Soil Conservation Service brought it out of obscurity and pushed it as an erosion control. They found it ideal for grassed waterways, buffer strips and wherever a dense sod was required.

A decade after its rebirth, bromegrass seed production is centered in Nebraska. In 1944 the state produced 7,300,000 pounds from 33,000 acres, or about half of the nation's yield. Seed is harvested from only a small percentage of the total acreage, however, for Nebraska has over 500,000 acres planted to bromegrass. Other leading seed-producing states are Kansas, Minnesota, North and South Dakota, Michigan, Idaho and Montana. Seed not used locally in the brome states mostly moves eastward across the corn belt, with the greatest demand in Illinois, Indiana and Ohio.

The Encyclopedia Says

Bromegrass, called *Bromus inermis* by the professors, is a hardy, long-lived perennial grass, spreading aggressively by rootstocks to form a dense sod. Leafy plants grow from two to four feet in height and are prolific seed producers.

The name "brome" has nothing to do with "broom", as it is sometimes pronounced. The generic name "brome" comes from the Greek "bromos", meaning oat-like; "inermis" literally is "unarmed," or "awnless." The meaning then becomes awnless oat-grass. Brome does resemble oats and some people wrongfully call the wild variety "wild oats." It is a common volunteer grass on American farm waste land. The use of the word "bromegrass" for brome is customary in the west.

Growth starts early in the spring and continues late into the fall. Essentially a cool weather grass, brome becomes more or less dormant in areas where mid-summer is hot and dry, stooling anew and shooting new leaves with the coming of cooler temperatures and autumnal moisture.

Seed, ripening in late June or July, is long and flat. It is light and chaffy, weighing only 14 pounds per bushel. Viability is 85 to 95 per cent, with purity of seed more of a problem than germination. Brome seedlings are frost tender for about three days when setting permanent roots. Once established, brome grass is winter hardy, even in Canada. Native wild brome is considerably less vigorous in growth and root structure than the imported tame variety. Hybridization of brome grass is on the way and will result in extra vigor, wider adaptation, disease resistance, and greater seed production.

STIRRUP-HIGH bromegrass on a western range. Its dense roots hold the hillsides.

Leading Varities

One of the best strains of brome was developed by the late Ackenbach brothers, George and John, of Washington, Kansas, who made selections from their fields for almost half a century. The strain bears their name. Their source of seed was in Nebraska, where in 1899 the Nebraska Agricultural Experiment Station reported, "that all things considered, brome grass is the most promising cultivated pasture grass for this state that has been tested on the Station farm." A few of the early plantings made fifty years ago are still in existence.

While all bromegrass strains do well in cooler climates, seed of northern origin is established with some difficulty when moved south and the seedlings do not spread aggressively. Lincoln brome, a certified variety developed in Nebraska, is a so-called "southern type". It does well all across Nebraska from south to north and in similar latitudes elsewhere. Achenbach (Kansas) and Fisher (Iowa) are other leading strains.

A Versatile Fellow

Brome grass is interesting because it can play four parts, either one at a time or all together. It is a soil binder and

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BROMEGRASS came from Russia fifty years ago. It withstands the most severe cold and weathers drought better than any other grass except crested wheatgrass. It is a natural for the semi-arid northwest.

THE FIVE-YEAR-OLD SOD of one of the first plantings of brome was plowed in March, 1908. It was like slabs of thick plaster and would have made a good sod house. After the third year brome becomes sodbound, must be reworked.

erosion control agent; it adds humus to the soil and subsoil and opens up packed soils; it is an excellent hay crop; and it makes a top pasture crop.

Once brome gets a toehold on a hillside, runoff, or gulley, the soil stays with it and spring freshets slow down and become tame and harmless when they encounter the closely-matted roots of bromegrass. Roots may penetrate to a depth of five or six feet but the average is about three and a half feet. On average soil there will be 3,500 pounds of roots in an acre of top soil four inches deep. If a heavy rain should silt over the plants, or wash away part of the root protection, don't worry; the brome will keep right on growing and will soon repair the damage. For sod flumes, terrace outlets, buffer strips and grassed waterways there's nothing that will beat brome—and if you are thrifty you can cut a crop of hay off these ordinarily wasted areas. State highway departments are using brome extensively for highway shoulders.

If you have a tired field on which the soil is lifeless, packed by beating rains or long years of cultivation, brome grass will be your best bet to get that field back into the profit column. Its volumnious root system will restore the soil structure, open up the lower layers to air and moisture, aid in moisture absorption, retard evaporation, and supply more than a ton per acre of humus to plow depth.

As a hay and pasture crop brome comes highly recommended. There is scarcely a seed mixture for pastures sold today which does not contain some brome.

A perennial, ready early in the spring and good in the fall, it gets its second wind and starts growing when most pastures are on the decline. It is a heavy yielder of forage and is nutritious and highly palatable. Hogs, horses, calves and beef cattle thrive on brome and dairy cows do especially well on brome-legume mixtures. It is also good for hay, when mixed with alfalfa. Brome works well in long rotations where infrequent plowing is desired. Alone, or mixed with a legume, it is a fine cover crop for every field.

Cash returns average $40 an acre. A well managed field can produce a crop of seed, a cutting of hay, and spring and fall grazing each year. Aside from pasture and hay, brome would amply pay its way if grown only for its tough, root-filled erosion resisting sod.

Bromegrass will do well throughout the corn belt. Straight brome is best grown for hay where the land is inclined to be on the wet side but the more usual brome-alfalfa mixture will thrive on any ground where alfalfa will grow. Bromegrass is not adaptable to the short grass country for it requires an annual rainfall of 20 inches or more.

Bromegrass, as US No. 2 hay, runs about 10 per cent protein, about a third less than alfalfa, and roughly twice that of prairie hay. In the pasture, protein content of bromegrass ranges downward from 25 per cent, depending upon the stage of growth and the rapidity of growth, and compares well with the cereal grains in protein content through the various stages of growth. Brome is higher in protein than blue grass the year around as it seeds later and has a longer, lusher growing period. Bromegrass has somewhat less carotene than alfalfa but is relatively high if cut in the lush green stage and properly cured.

Although producing low tonnage, brome makes good silage. It is handled about like rye. A brome and alfalfa mixture is a superior silage material (see Farm Quarterly, Summer 1946, "Silos and Silage").

Seeding and Fertilizing

A firm seedbed is a must; most troubles in obtaining a stand arise from too loose a seedbed or too deep planting. Either work the soil little or work it thoroughly.

Brome can be drilled directly into wheat stubble if weeds are not serious; otherwise a disking should precede seeding. When planted with a legume, the ground should be plowed early, disked and harrowed to pack solidly and eliminate weeds. A corrugated roller or cultipacker run over the seedbed before and after drilling will do much to guarantee a stand.

Seeding is shallow—one-half inch to an inch in depth—at the rate of 14 pounds (one bushel) to the acre. If intended for pasture or hay three pounds of alfalfa should be included with each bushel of brome. Sweet clover is often drilled in fall-

sown fields of pure brome the following spring at the rate of six pounds per acre; red clover likewise. A general rule for seeding brome-legume mixtures is to sow one-third the amount of legume that would be required for a straight seeding of the legume. For seeding waterways, flumes, etc., this amount is frequently doubled—28 to 30 pounds per acre.

Where weed competition is a problem, the most favorable time for seeding brome grass is from mid-August to late September. Spring seeding, if done early so that the seedlings may become established before hot weather, produces good stands. Spring plantings are made a little later than oats.

Because brome seed is so light and chaffy, some difficulty is encountered in planting with an ordinary drill. It is a good idea for someone to ride the drill and occasionally stir the seed with a stick to assure an even flow through the seed spouts. Brome won't pack so readily if the seedbox is filled only half full. A peck of oats to each bushel of brome will facilitate drilling; the heavier oats will pull the brome through the spouts and will also serve as a nurse crop. In fall waterway seedings, the oats assure a quick cover and reduce the chances of erosion before the grass has established itself. Seed may be broadcast on the surface and then harrowed or rolled in.

For spring plantings, a mowing of the weeds about the middle of June before the onset of hot weather is desirable. The sickle bar should be kept high. Weed control is not much of a problem in fall-sown brome. When brome is started in the fall, a seed crop may be taken the following summer but full production is not attained until the second year. The seed ripens in late June or July.

Due to the relatively heavy nitrogen requirements during the spring months, plantings of brome alone become stunted after three or four years, turn yellow from lack of nitrogen, and yields of forage and seed are reduced. The condition commonly is known as "sodbound." Seeding with a legume postpones the decline in production a year or two, and production can be stimulated by application of barnyard manure or commercial fertilizer. Three tons of manure per acre in early spring after the top growth is three inches high will work wonders with either brome or brome-legume mixtures.

While brome does best on rather fertile soils, in combination with a legume (which will supply the nitrogen) it is a rejuvenator of poor soil and grows satisfactorily in clay or heavy soil if nitrogen is supplied to start it off.

Commercial fertilizers will more than pay for themselves, too. At the University of Nebraska Experiment station, production of bromegrass seed in old fields increased as much as 54 to 239 pounds per acre with the addition of nitrogen fertilizer at the rate of 60 pounds per acre in

CHAFFY BROME SEED should be mixed with a filler when seeding. Oats are a good filler and nurse the brome seedlings. If broadcast, avoid high winds and harrow in. Some farmers use the fertilizer spreader on their grain drills to sow the seed.

BROMEGRASS SEEDS, falling in cracks after summer droughts sprout during the autumnal rains and stitch up and bind the earth to prevent winter erosion and soil loss.

early spring. Forty to 60 pounds of nitrogen showed forage increases from 542 to 4,028 pounds per acre. The application of 400 pounds of ammonium sulphate to old stands increased the seed yield from 221 to 436 pounds at Manhattan, Kansas.

Brome Grass for Seed

Clean seed in recent years has brought 10 to 20 cents per pound on the farm, with a premium of 10 to 15 cents for certified seed.

Seed harvest comes just after wheat combining. Second and third year production on ordinary soils will average 250 pounds per acre; five and six hundred pound yields are not uncommon under extra favorable conditions. Hence, cash returns from seed alone for several years will be $25 to $50 per acre for uncertified seed, with added benefits in pasture and/or hay. Some certified growers top $100 per acre in returns in years of good yields and high prices.

Although brome may be cut with a binder and threshed, the most satisfactory method of harvest is combining. By clipping the grass just under the seed heads, the seed of short weeds can largely be avoided. Noxious weeds particularly to be avoided are downy (or wooly) brome, chess and cheat, which because of similarity are difficult, if not impossible, to separate, thereby lowering the quality of seed.

Because of the chaffy nature of the seed the air blast should be cut to a minimum and the combine operated at slow to moderate speed. Attempts to cut too wide a swath will sometimes result in overloading and loss of seed. Running the seed through the combine a second time or through a fanning mill will clean it up if it is too much fouled. It is also important not to overcrowd in bundle threshing.

Brome seed will heat easily. Storage bins should be ventilated and the seed spread as thinly as possible and worked over a time or two during the first two or three days of storage.

When conditions are such that alfalfa will set seed, both brome and alfalfa seed may be taken from a mixed field. The taller brome is first combined, then the alfalfa is windrowed. Using a pickup attachment, the alfalfa seed can be combined from the windrow. Although the straw from threshed bromegrass contains only four or five per cent of protein, it is relished by horses and makes a good supplement with grain.

Brome Grass for Pasture

Brome alone as a pasture crop is not as preferable as brome in mixture. However, if you have an eye to the seed crop, straight brome it shall be. It will do better than timothy for nutritional value and will be a real pleasure when most pastures are brown and bare in late autumn. In managing straight brome as pasture there should be caution and care taken in grazing.

You can kill the goose that lays the golden eggs if you pasture brome too closely, or too soon. It should have several week's growth in the spring before grazing to permit the roots to get a firm start. Some growth should be left at the end of the grazing season to permit the roots to store up a reserve for the winter months. Overgrazing in the fall will slow spring growth and will reduce the yield of seed at maturity.

It is in mixture with other forage crops that brome makes the best pasture. The top is a brome-afalfa mixture. This mixture has a high carrying capacity. Feeders estimate that on such fields cattle will consume one-fourth less corn or grain. Gain may be a trifle slower but it will be certain. Brome's forage value is enhanced by the fact that it remains palatable up to maturity and stubble appears to find as much favor with stock as the whole plant.

When it is pastured with legumes brome reduces the danger of bloating but care should be taken in introducing milk cows to the brome-alfalfa pasture during the dormant period of the brome. The alfalfa may be dominant enough to cause bloat.

Permanent brome pasture, either alone or in mixture, ought to be stimulated annually by fertilizer, as mentioned previously. Needed nitrogen is also made more available by tearing up the sod with a plow, chisel, duckfoot, groover or disk. The brome won't be damaged; it will come back stronger than ever and seeding of a legume into the disturbed sod is possible. Brome can be added to pastures after disking in the spring or fall.

Brome definitely lengthens the pasture season. Emil Haas uses brome to get 10 months of pasture along the Nebraska-Kansas border. His system involves two fields of brome and one of native prairie grass. Haas pastures one or both patches of brome until mid-April, then closes off one for seed production, pasturing the other until mid-July. About the time the brome becomes dormant, the slow starting prairie grasses are ready and are grazed during the hot summer months. Fall rains start a new growth of brome and the livestock is returned to brome until winter. High brome stubble will shoot leaves under the snow during winter and provide early spring grazing. To maintain seed production at the highest levels, Haas alternates harvesting the two brome fields.

Brome pasture will last indefinitely with

THIS KANSAS FARMER harvested 2000 lbs. of seed at 30 cents a pound from his four-acre field of brome. The year before 39 hogs were pastured on the four acres.

proper fertilizer management. It will self seed and also spread by rootstocks.

Brome Grass for Hay

Brome-legume hay is a popular combination inasmuch as all legume-grass hay mixtures are better feeds than either legume or grass alone.

Don Morton, Nebraska Milking Shorthorn dairyman, prefers brome-alfalfa to straight alfalfa. He says, "It's a greater chore to cure. The mixture packs more, cures a little harder and takes a little longer. But we can retain more carotene and protein in the mixture. Alfalfa stems are less coarse in the mixture than when alone; the brome is more leaf than stem and helps to retain the alfalfa leaves which have a tendency to crumble by the time the stem cures in pure alfalfa hay." Brome or brome-alfalfa hay will rarely be found on the commercial markets because producing areas have never had a surplus.

Brome-alfalfa meadows will produce as many cuttings yearly as alfalfa and the tonnage will be higher. Minnesota figures disclose the brome-alfalfa hay mixture will, over a five year period, outyield either brome or alfalfa. Yields will be up to 50 per cent higher at the end of the fifth year.

For hay, brome should be cut just when it is starting to bloom, leaving the second growth for pasture. Yields are from one to four tons per acre, with quality and feeding value comparable to timothy.

Bromegrass hay should not be fed exclusively to dairy cows. It is too low in protein, not as succulent as alfalfa and is not a substitute for a legume. This does not apply to a brome-legume hay mixture, which is an ideal hay feed for cows.

The brome-alfalfa mixture can be used indefinitely for hay or pasture but after production begins to dwindle through sod-binding, the field should be returned to crops or redressed.

Bouquets and Brickbats

Bromegrass alone is not superior to other pasture or hay crops but in mixture with legumes it is a sort of catalytic agent —boosting forage yields and lengthening the life of pasture.

COMMON on American farm wasteland are these wild brome weed pests. Botanists call them *Bromus Japonicus* and *Bromus Tectorum*. Animals like them anyhow.

TOPS IN PASTURE MIXTURES is brome and alfalfa, especially recommended for hillsides. The mixture will produce pasture, both alfalfa and brome seed, and hay.

A bromegrass testimonial from Frank and Duane Allington, father and son farming combination of Blue Springs, Nebraska, is an eye-opener. Frank says:

"We have 92 acres of brome and alfalfa mixture. Some 350 pigs and hogs had the run of 77 acres of the mixture from April 10 until 300 were sold from July to December, and the remaining ones were still getting some green feed at Christmas time. They were never taken out of the fields even at harvest time; we were just careful that we didn't hit any of them with the combine. Twenty acres were not harvested for seed but supplied all of the pasture for 50 head of short yearlings until the seed was harvsted on an adjoining 46 acre field after which the steers and hogs both had the run of the field which supplied the pasture for the steers until October 1. The remaining 15 acres were just used for seed and hay.

"We combined 5,000 pounds of certified brome seed about July 15, cutting just as high as we could, still getting the brome seed and leaving a stubble of alfalfa in bloom and some seed pods forming. About August 10 we cut the brome stubble and alfalfa, using a seven-foot mower with swathing attachment; a few days later we got about three bushels of alfalfa seed using the combine with pickup attachment. "We baled the mixture with a pickup baler and got about 300 bales of fair hay. About October 1 we mowed and baled 400 bales (14 tons) of choice hay. The cash income of brome seed, alfalfa seed and hay, after leaving enough hay on hand to feed several carloads of steers, was $4,000."

Straight brome is a poor crop immediately ahead of nitrogen-needing crops as the roots tie up available nitrogen and decay slowly, thereby limiting the release of nitrogen for the first year or two, but a brome-legume mixture is fine for corn.

General disadvantages of brome are difficulty in plowing, dormancy in dry-summer and the difficulty in getting a stand unless the seed bed is firm and planting is shallow. Like any other plant it needs periodic fertilization.

★ ★ ★ ★

THE FIRST STEP in the preparation of an inoculant for a legume takes place in the laboratory. Here a nodule has been removed from a healthy plant and placed on a sterilized Petrie dish. The nodule is cut open and the bacteria in its core will be examined under a microscope to study their health and vigor. Desirable strains of bacteria, such as those from this soybean root, will be put into an incubator where they will be carefully cared for under conditions suited to rapid growth.

THE FRIENDLY BACTERIA

In Nodules on Roots of Legume Plants Live Millions of Bacteria. They Take Nitrogen from the Air and Convert it Into Compounds that Nourish the Plants

SEED inoculation is not new; the Dutch who have always been extremely clover conscious because of their large herds of dairy cattle, have practiced a simple form of seed inoculation for centuries. They knew that clover seed "caught" better in a field that had been in clover the year before. Long before scientists discovered the presence of nitrogen-fixing bacteria in the soil that had been growing legumes, the Dutch farmer passed this advice on to his children, "to make clover seed catch in a new field, shake it in dirt from a good clover stand."

The Dutch farmer's method of insuring a better "catch" of clover has a modern and more effective counterpart, which we call "seed inoculation." Shaking the seeds with dirt from a good clover stand puts them in contact with the legume-loving bacteria, one of the genus *rhizobium* of which we know over twenty species. Inoculation does the same thing in a scientific manner; the bacteria are grown in a laboratory and packaged at peak strength for use with legume seeds, specific bacterium for certain seeds.

To understand seed inoculation and why it is necessary today we first must know something about these bacteria and how they live on legume roots and go about trapping nitrogen, which they turn over to their legume-hosts to feast upon. The subjects of legumes, nitrogen and soil bacteria are all tied up closely together.

In this country the pioneer farmer didn't worry about such details as shaking clover seed with soil. His newly cleared woodland was heavy with humus, which contained a good nitrogen supply along with other plant nutrients. In it any crop would grow abundantly. The nitrogen had been left in the soil by centuries of growth of single-celled green plants, such as the algae, which are able to extract nitrogen from the air, and by the nitrogen-fixing bacteria.

As farmers turned and returned the soil, the humus was used up and the rains beat down on the unprotected soil, battering out its tilth. Nitrogen slid out of the soil by leaching and the growing plants sucked it up. In the southern states, where rainfall often averages 70 inches annually, the native nitrogen supply was depleted very rapidly. In the north, with annual rainfall of about 30 inches, the original nitrogen supply has lasted up to 100 years, where sound farming practices have been used.

Today the problem of the replacement of the nitrogen in the soil is with us in almost every section of the country. This doesn't seem too difficult at a first glance. Most of us remember from high school chemistry that the air is made up of 80% nitrogen. Scientists estimate that there are about 37,500 tons of nitrogen floating about in the air above every acre of soil. However, a little investigation discloses that this vast reservoir of essential plant food is about as useful as the surrounding sea was to Coleridge's *Ancient Mariner* who complained, "Water, water everywhere, and not a drop to drink."

Just as the seamen distills salt water to make it palatable, so nitrogen from the surrounding air may be transferred to the soil by combining it with oxygen and hydrogen to make it accept-

LEGUME BACTERIA are multiplied in an air and temperature controlled incubator where they live in nutrient Agar (a jelly containing growth-promoting substances). In this laboratory are bacteria strains from most states and for every common legume. New strains from Holland, Germany and Japan are being tested. One test-tube of clover bacteria has been kept alive and growing since 1912.

able to plants. One way that this is done is by electrical discharge. A bolt of lightning during a summer storm may "fix" a hundred pounds of nitrogen from the air and deposit it on the ground in the form of ammonia. Nitrogen producing factories like Muscle Shoals, Alabama, use a man-made, high-voltage electrical process to take nitrogen from the air. This becomes the nitrogen content of commercial fertilizer, a quick but expensive source of nitrogen for the soil. But by far the greatest amount of nitrogen used for farming is removed from the air by friendly nitrogen-fixing bacteria that grow on the roots of legume plants. The term "fix," which is used so much in connection with nitrogen, means combining free or elemental nitrogen with other elements to form compounds which can be used by plants. This is done commercially by combining Nitrogen with Hydrogen to gen to form a Nitrate (NO_3). A common form an Ammonium (NH_4) or with Oxy-form of an ammonium fertilizer is Ammonium Sulphate $(NH_4)_2\ SO_4$. Nitrate of Soda ($NaNO_3$) is a common nitrate fertilizer.

Raise Any Perigynous Exogens?

Growing legumes is the simplest and most economical method of putting nitrogen into the soil. In addition, farmers who raised soybeans during the last few seasons found that this legume was one of the best—at two to three dollars a bushel—for putting cash in the bank. The legumes, which the botanist defines as *perigynous exogens,* are in everyday life the many-petaled plants that bear pod-like fruit. They are members of a vast family of some 8,000 species. Our most common legumes are beans, peas, lupines, alfalfas, lespedezas, and vetches. To be strictly accurate, we should call these "leguminous plants" not "legumes" since "legume" is the correct name for the pod or fruit. They grow at all altitudes and all over the world. One large sub-family has flowers which look like butterflies, the *Papilionaceae,* from the Latin word for butterfly. Our common sweet pea is a member of this family and has such a flower. Besides foods for man and beast, legumes yield medicine, from Laburnum; dyes, from Indigo; lumber from Locusts; and resins, fibres, and gums. The legume family has its black sheep, too, like the Texas Locoweed, which makes horses, cows, and sheep go crazy.

The legumes are the back-bone of every crop rotation. Their deep tap roots (alfalfa has been known to have 30-foot roots) go far into the sub-soil, opening it up, and bringing water and plant food for their use. When they are plowed under they add rich organic matter to the soil. Morrison, in his "Feeds and Feeding," lists six points of superiority of legume forage over all other forage crops; and these are in addition to the ability to maintain and improve soil fertility. They are:

(1) Legumes lead in the yield of palatable hay produced per acre.
(2) They are the richest in protein of all common roughages.
(3) The protein, which legumes supply, supplements effectively the deficiencies of the proteins of cereal grains.
(4) Legumes have the highest calcium content per ton of all common feeds. Although they are not rich in phosphorus, they are usually a better source of this mineral than corn, sorghum or grass forage.
(5) Well-cured legume hay is the richest source of Vitamins A and D for winter feeding.
(6) Legumes such as alfalfa and clover, increase the yield and protein of other grasses that are grown in combination with them.

Bacteria With Halos

City kids are taught that success and good health in life depend, among other things, upon avoiding bacteria. But farm boys studying vocational agriculture are pretty well aware of the value of getting acquainted with the nitrogen-producing bacteria. These tiny workers have established themselves as some of man's best friends. As one scientist pointed out, "They work for nothing, board themselves, and pay for the privilege." We know what these bacteria look like—we have isolated some twenty groups of them—we know how to make them multiply; we package and sell them like spaghetti; we know how they affect the legume plant roots, but we don't know how they make nitrogen available.

We *think* it is something like this. Legume bacteria are minute one-celled plants, which can be studied under a microscope. The mature cells reproduce by dividing. Figure 1 shows a magnified group of legume bacteria. When the legume seed is properly coated or inoculated with bacteria, it appears as in Figure 2. The bacteria come in contact with the roots as in Figure 3. In figure 4, a highly magnified view of the bacteria entering the root hairs, we see the start of a nodule, of which a view is given in Figure 5.

The legume supplies food to the bacteria, and in return the bacteria reciprocates by fixing and supplying nitrogen. The method by which the bacteria changes

the nitrogen in the air into nitrogen in a form the plant can use is not known, but the results of this symbiotic relationship have been calculated many times in increased crop yields. Often it is the difference between profit and loss.

Recent controlled tests at Purdue between inoculated and uninoculated soybeans showed a gain of 12.4 bushels per acre for the inoculated beans. The results farmers have had in using inoculation don't give a scientific comparison, but they do give the practical side of its use. John Elmers, of Curtice, Ohio, inoculated the seed for a field of soybeans in 1946 and seeded them in a drill without fertilizer in early June. His neighbor, who had an adjoining field, wasn't able to get any inoculation bacteria at the local store, so he let it go. Both fields had the same general treatment and the same sun and rain. In the fall, Elmers combined an average of 18 bushels to the acre and his neighbor didn't bother to have the combine stop; the crop wasn't worth it.

There are plenty of people who are skeptical about inoculation. They will point out that their clover yields plentifully and that they can dig up a plant and show you nodules on the roots. "And I didn't monkey around with inoculation," they will tell you. All of which is perfectly true. Usually legume bacteria are present in the soil and they will attach themselves to the roots of new plants; but they are not always the most effective type for the legume that is planted. The U. S. D. A. points out that, "Even when nodules are produced on legume roots by the organisms already present in the soil, a striking improvement in yield may sometimes be obtained by using a selected culture adapted to that particular type of legume."

There are eight general groups of legumes that require different types of bacteria, as well as many other less common special groups. Bacteria that will work well for one group will not work with the plants of another group. It is important to get a culture of bacteria that has been tested with the group with which it is to be used. The bacteriological laboratories that package legume bacteria constantly are checking the efficiency and compatibility of the bacteria that they sell for use with the various groups of legumes. When an improved culture is discovered for a certain seed it replaces the older, less efficient bacteria.

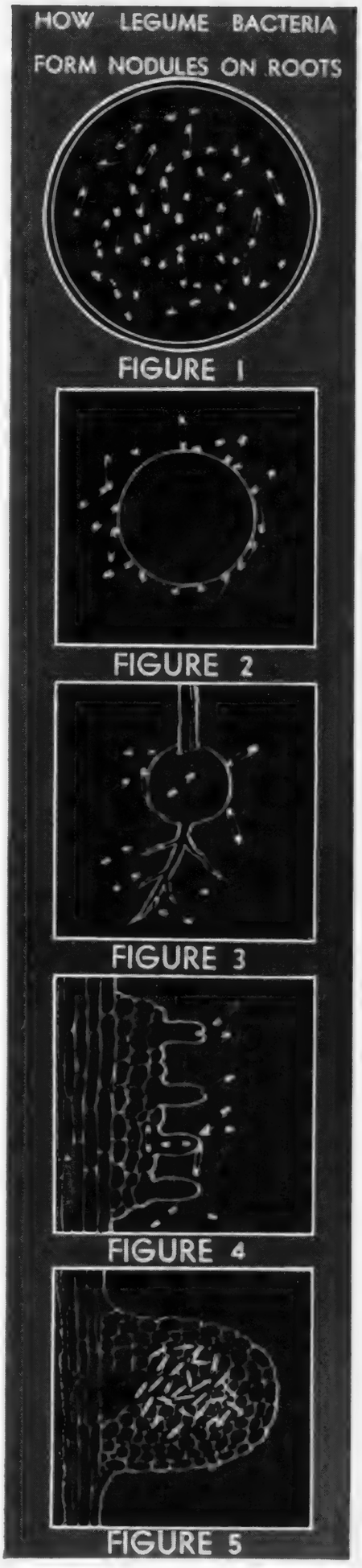
In any case, the old Dutch method of inoculation, of mixing the seed with soil from another legume field, is not preferred since the bacteria may not be the right variety, or if they are the right variety, they may have lost their efficiency. Nor should inoculation be omitted because the field had a legume in it a couple of years back. The bacteria may have died out or may have washed away. In any case, they will probably not be present in sufficient numbers to do the job right.

Inoculation of seeds before they are planted is not expensive; a quarter's worth of inoculant will take care of enough seeds to plant an acre. Inoculation doesn't take much time; the seed for 10 acres of meadow mixture can be inoculated in half an hour by one man. Inoculation usually pays off in the crop yield; fifteen to twenty-five per cent increase in the legume yield is not unusual. Of course, inoculation will not beat a drought or a cloudburst, but in an average year it will make a good crop of soybeans or a good stand of alfalfa even better. Inoculated legumes add to the nitrogen content of the ground; a good stand of a legume will add 100 pounds of nitrogen to an acre of ground if the nitrogen forming bacteria are well established on the roots of the plants and the whole crop is returned to the soil as green manure. If the bacteria aren't there, the crop may do fairly well but the roots of the plant will be taking the nitrogen out of soil instead of the bacteria providing it from the air. The 100 pounds of nitrogen added to the soil is equal to the nitrogen in 10 tons of manure, or 625 pounds of Sodium Nitrate, or 500 pounds of Ammonium Sulphate, or 1,000 pounds of 10-20-20 fertilizer.

Why then, the average reader may ask, doesn't every farmer inoculate all of his legumes. The most likely answer: It is just one more detail to take care of, and in a work day of 12 hours, there can be so many details accumulate that the main job is delayed. The continuing better results farmers are getting from inoculated seeds indicates that this is one detail that is paying off. Last year they bought packaged inoculants for almost 15 million bushels of seed.

How The Bacteria Are Grown

Legume bacteria are grown under scientific controlled conditions by a number of laboratories. The parent cultures of the bacteria are kept in test tubes on a film of nutrient Agar. Agar or Agar Agar if you want to be technically correct. is a jelly-like substance which is obtained from a specific kelp in the Pacific Ocean. Most of it used to come from Japan, but now a good part of our requirements are taken care of by West Coast kelp processors. When sugar is added to the jelly, it becomes an ideal laboratory breeding ground for all kinds of organisms and bacteria. The test tubes are maintained at a constant temperature in an air-conditioned room. From these parent cultures, bacteria are introduced onto larger growing areas in bottles and are finally put into large tanks, called incubators, where the mass production of the bacteria takes place. In combination with water, sugar, and other nutrients and growth promoting substances, the billions of bacteria make a rapid growth and multiply into astronomical numbers while breathing the stream of sterile air which is forced into the tank.



INOCULATING a meadow mixture is a simple job. Put the seed on a canvas and moisten it lightly with water. Use the correct inoculant for the seed that is to be planted. The box will indicate the amount to be used. Mix, with your hands, a shovel, or a wooden paddle until each seed is coated.

SOYBEANS can be inoculated in the drill. Moisten them and sprinkle the correct amount of inoculant over them. Stir until they are coated.

The bacteria are produced and packaged in the early months of each year so they will be fresh and efficient for the growing season. They are either mixed with a moist black humus or packed on an Agar jelly. The mixture is packed in either moisture proof cans or Pliofilm containers which are protected by a cardboard box. The bacteria in the Agar are usually put up on a glass bottle. The year in which the bacteria should be used is stamped on the box and some manufacturers stamp an approximate bacteria count on the container. Precautions are taken by the manufacturer to keep the bacteria cool and fresh. The rest of the handling and storage by the dealer is another story. The user should satisfy himself that it hasn't been stored in the sun or in a hot spot next to the furnace.

How To Inoculate

The idea of inoculating a seed is to coat it with the right kind of bacteria. Check the label on the package to see that you are using the right inoculant for the seed you are planting. There are several methods of doing the inoculating. First, place the seed on a clean floor, a canvas, or in a tub. Next, dampen the seed so that each seed is coated with a film of moisture, but is not wet. Then, pour the right amount of the correct inoculant called for in the directions over the seed in small batches, mixing it well with the hands, a shovel, or a wooden paddle. Or, the seed may be left dry and the inoculant mixed with water and poured over the seeds and mixed well. The seeds should be planted as soon as possible after coating with the inoculant. If the bacteria are packed in a bottle on a jelly-like substance, which would be Agar, they can be washed out by shaking the bottle and applied by pouring this over the seed.

The bacteria are not harmful, even if there are cuts on the users hands, because they are not disease producing varieties. They can be handled freely. A manufacturer of inoculation bacteria tells of receiving a frantic phone call from a farmer's wife a few years ago. She had mixed water with Agar-packed inoculation and was ready to take it to the barn. In response to the sweet smell of burning cherry juice she turned around to take a pie out of the oven. Son Chris had taken a long drink of the bacteria; what should she do to save him? The bacteriologist advised a dose of castor oil and the purchase of more inoculant out of Chris' piggy bank.

Another method used to inoculate soybeans is in the drill. The beans should be moistened and the inoculant shaken over them while mixing the hopper-full of seed with a "T" shaped stick or a hammer. For inoculating large quantities of seed, a clean concrete mixer can be used.

The "Take Cares"

No more seeds should be inoculated in a day than can be planted, and if rain de-

lays the planting it's safer to reinoculate when you are ready to plant, to be sure of having virile bacteria coating the seeds. It has usually been thought that chemical seed treatments such as damping-off fungicides would kill the nitrogen-fixing bacteria and that they should not be used together. As an exception to this rule, one manufacturer, the United States Rubber Company, is advertising that their seed protectant "Spergon" may be used safely with inoculants.

Inoculated seeds can be drilled with fertilizer; fertilizer in quantities of not over 250 pounds to the acre will assist the germination and provide roots quickly for the bacteria, and if there is anything a bacteria likes it is a home to call his own, along with his several million relatives. Larger amounts of fertilizer may make the bacteria punch-drunk, and they will get off to a slow start. Tests have shown that the bacteria can withstand just about as much fertilizer as would safely be put on with the seeds.

If it is at all possible, inoculated seeds should not be planted in dry soil. Legume bacteria are sensitive to drying out and many will die before the seed germinates if the soil is very dry. However, there are not many Spring planting seasons when there is not enough moisture present in the ground to germinate seeds. There is some protective value in the humus with which the bacteria is mixed. It usually will keep them moist and alive until the seed starts to grow.

They Wear Fur-lined Underwear

Legume seed, such as Ladino Clover, can be broadcast on snowy ground without losing the benefits of inoculation. Freezing weather does not bother these bacteria, and if the snow is melting, the moist, wet ground is an ideal place for the bacteria to await the warming sun which germinates the seed.

If a meadow mixture is to be planted which requires several types of inoculant, the various kinds of inoculant may be mixed together and applied to the seed mixture at one time. The inoculant will not harm any non-legume seed which is in the mixture.

Lime is as necessary for the health and happiness of legume bacteria as it is for good growth of the legume. Soil should be tested and lime applied, if it is needed, at least six months ahead of the seeding of a legume. A pH of 6.5 will grow good crops of legumes. The lime will also encourage the other micro-organisms which make plant food available. The newer thinking in liming for legumes based on the findings of Dr. W. A. Albrecht at the University of Missouri is that frequent liming is necessary for most crops, but it is imperative for legumes; for in growing them it is also necessary to replace the heavy drain of calcium by both the legumes and the nitrogen-fixing bacteria.

The Soybean Myth

"One of the stories we hear at least once a week from farmers is that 'Soybeans build up the soil'," says Professor Ralph Kenney of the University of Kentucky. "The idea has gotten around that all legumes build up the soil, and that if you raise a crop of soybeans, and combine the beans, you have done a fine thing for the soil. The exact opposite is true. Legumes require plant food just like any other crop. Out of the soil they take nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, manganese, hydrogen, oxygen and traces of many other elements like boron, zinc, copper, and iron. You will have to apply fertilizer to get a good yield of legumes just as you do for any other crop. The difference between soybeans and corn, say, is that properly inoculated soybeans can, with the aid of the nodule bacteria, supply their own nitrogen and in addition put some into the soil. However, everything that the corn plant uses, except oxygen and carbon, must come from the soil. Soil tests and application of proper fertilizer are just as necessary when growing legumes as with any other crop."

How To Beat The Weeds

Legumes that are inoculated properly will get the jump on weeds and crowd them out of the sunlight on top and beat them to the water and plant food in the ground. As the harvest-time for the forage legumes comes along, the increase in the quality and quantity of the leaves can make the livestock feeding much more profitable. The protein content of good well-cured alfalfa can run as high as 16½%, and that's almost a dairy ration in itself, considering its high calcium and vitamin content. On the other hand, poor, stemmy, nitrogen-starved alfalfa may go as low as 10% protein. The average of experiments at the Iowa State Agricultural Experiment Station also have shown a decided protein advantage for inoculated soybeans. Here they have yielded 20 per cent more beans per acre; the beans have yielded 9 per cent more protein; the protein production per acre has been 30 per cent more; while there was 3.5 per cent less oil in the beans, the oil yield per acre was 16 per cent more.

All Is Not Gold

Like every other product that cannot be valued by weight, color, or outward appearance, the inoculant business has its "racket fringe." A few years back, farmers were buying ground charcoal in Indiana and wondering why it didn't make any difference in their alfalfa growth. Indiana now has a law, passed in 1937, which regulates the sale of inoculants and other plant growth substances. A manufacturer must file a registration certificate and properly label the inoculant as to type and expiration date. Samples of the inoculant are picked up and tested from time to time by the State Chemist. Any product that does not perform as labeled

(Continued on page 138)

USING an inoculant won't guarantee a stand of Ladino clover knee-high to a Holstein. But it is one of the details that make a lush pasture like this available in August, if the planting is done early and the weather is favorable.

GOLDEN HAMSTERS came originally from Syria but the Germans gave them their name which means "to hoard." They are good laboratory animals for they are subject to many human ills. They're cute too but may bite when they are provoked.

Hamsters

BY SETH THOMPSON

AMONG the newer forms of livestock being raised in this country is an animal about six inches long that bites off more than he can chew just to pass the time away and spends his spare moments reproducing. The Syrian Golden Hamster is a rodent that was first imported from the Syrian deserts in 1938 to substitute for the guinea pig as a living laboratory test tube. Since that time he has had a good press, and gained considerable notoriety among hobbyists. The demand for hamsters as pets, laboratory animals, and breeding stock is on the upswing, and hamsters themselves are doing their part to meet this demand.

Al Hayner, who operates the Hayner Hamstery in Normal, Illinois, started raising hamsters seven years ago when the field was still young. He began with three females and a male, and at the end of eight months found he had a shed full of hamsters and no market for them. That was before they were being used by the thousands as laboratory animals. He says, "After the first eight months my colony was reproducing so rapidly that I found it necessary to exterminate hamsters by the hundreds." Then came the boom and within the past year he has decided to make hamsters his full-time job. He now ships about 1000 a week.

The hamster looks somewhat like a cross between a mouse and a chipmunk that lost part of his tail in a brush with a cat. Because he is a rodent he has many characteristics of rodents as well as a few that he brought with him from abroad. His teeth are long and curved and capable of bringing blood, but he has a temperament that makes him easy to tame. He wears a topcoat of reddish brown fur, and his belly-side is white. Along either jaw he carries a built-in knapsack where he can store about half his own bulk in food.

The female makes more use of these pouches than her mate does. Her food storage compartments are invisible until she begins to fill them. She browses around her cage picking up food and tucking it

away in her pouches until she is mostly head. When she can't hold any more, she takes her loot to a corner of the pen and buries it. This seems rather futile, for often while she is off for another load her mate raids her cache and a vicious cycle is started. Since it's all in the family, she seems not to mind. When she catches him in the act of robbery she simply chooses another corner.

The hamsters' habit of storing food has earned for them their name, for the German word *hamstern* means "to hoard."

After a hamster has stored a load of food, he sits up, rubs his front feet together, and then gives his face a job of dry cleaning as though his social standing hinged on cleanliness. Hamsters are on the finicky side in their daily habits.

War Refugees

The hamster's immigration was arranged in time for the little animal to play a vital part in World War II. They were found to be susceptible to many of the new diseases that American fighting men encountered around the world.

Amazed scientists discovered—and many an American is alive today because of it—that this Syrian refugee is (1) capable of reacting under laboratory tests to more human diseases than any other animal, (2) capable of multiplying faster than any other domestic animal, and (3) can get along with less food and attention than any other lab animal except his cousin, the mouse.

Hamsters are so susceptible to tuberculosis that hamster growers refuse to give their animals milk from untested cows. They react to the disease as does a human, and positive reactions may be obtained in 10 to 14 days. The cattle industry benefits from the hamster's susceptibility, for they react to bovine tuberculosis. They have been used in mare abortion tests, and in nutritional studies of both human and animal foods. By tampering with their diet a scientist can cause their teeth to decay. Most state agricultural colleges now keep herds of hamsters for laboratory experiments.

Hamsters have several points in their favor as pets. They are small and friendly. People also like to handle them because they are alert and active. They take but little room and a few pennies will feed them for a whole day or two it's no great calamity for the hamster can get along on what he has stored away.

They have found a welcome from many high school biology teachers who find them more practical than bees and butterflies to teach their students the facts of life. A hamster's complete family life can be traced in one semester.

Should I Raise Them?

Hamsters are easy to raise. In fact, some fanciers say the trick is not how to raise them, but how to keep from raising them. There have been no recent reports of fortunes made in hamsters, but there are a lot of people right now who are making more than cigarette money on a rising market. A person shouldn't buy a few hamsters and expect them to support him, but if he goes at it right, they may pay the landlord. If he wanted to surround himself with them they might become a full time small business.

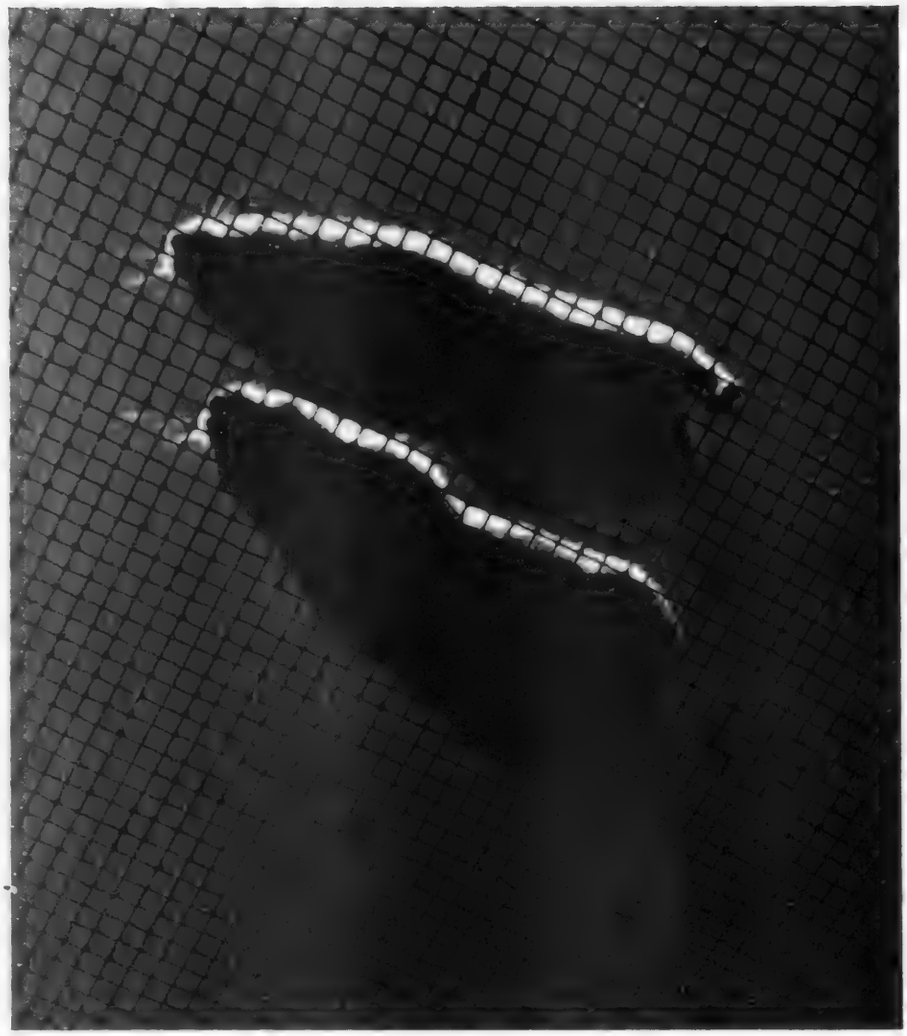
For the person who already has a few hutches of rabbits or guinea pigs, hamsters fit easily into the daily chores. Most indoor rabbit houses have a corner that could be cleared out for hamster cages. The main factors that determine whether or not you should raise hamsters are: (1) Do you want to raise hamsters? (2) Do you have a place where they could be kept healthy? (3) Do you have a half-hour a day to care for them? (4) Will your family think it's queer if you spend your time with rodents?

A TIN CAN makes a good handling cage to protect human fingers from hamster teeth.

Good Breeding Stock

A trio of hamsters will give you a start. Get one male and two females, or if you prefer, get two unrelated pairs. Don't buy

HAMSTERS REQUIRE warm, dry housing but not much of it. Pens can be stacked six or seven high to save space and chore time and a whole brood can live comfortably in one pen. A short handled hoe is the only tool needed for the weekly cleaning. Feed is thrown in on the floor and the water cans filled from the outside. Feeding and watering are daily chores but take only a few minutes when pens are well arranged.



BEGINNERS OFTEN have trouble separating the sexes. The male's chassis (top) terminates in a bulgy rounded rump, while the female's (bottom) comes to a point.

A NEW BORN HAMSTER can take a nap in a thimble. This litter is about half grown. At four weeks they are ready for the labs and at six to eight weeks they breed.

a whole herd of hamsters for two can soon become a herd. If you're really going at it in a big way, get three pair and an adding machine. Three-week-old stock is commonly sold for breeding purposes. This is the age at which they are usually weaned. One of the country's biggest breeders of hamsters, however, says, "For better breeding stock, the young should be left to nurse until about four weeks old; otherwise they will be stunted." You can breed the females when they are six to eight weeks old. If you buy older stock ready to breed insist on virgin females for they have only about half a dozen litters during their entire life. There is only one color of Golden Hamster and seldom is there such a thing as a throwback. The red back and sides and the white belly are the colors worn by all of them.

Your success with hamsters will hinge partly on the size of the litters that your females have. If you have the opportunity to select them yourself get the largest ones from the largest litters. This rule is not infallible, but it is a good one to follow. As yet there is no such animal as a pedigreed hamster although some larger breeders keep a complete register of their stock and sell for higher prices. Their animals should be worth the extra money. As yet there is no hamster registry association.

Breeding stock isn't expensive. You should get a good pair for $5.00. Some may ask as much as $15.00 for a trio, but unless you're serious about hamsters as a full-time job you needn't go that high. Many smaller breeders sell males for a dollar and females for around a dollar and a half.

The number of places where you can buy breeding stock is increasing, because there are always new people getting into the business and soon after they do, they have hamsters to sell. There are already better than 3,000 hamster breeders in the country. They can be located through local rabbit clubs, feed stores, and by scanning advertisements in pet and sportsman's magazines.

Where You Keep Them

Location of the pens is important. If at all possible they should be in a building, in a spot that is dry the year around and not too light. The pens can be kept outdoors but they must be protected from rain. Garages and basements make good spots for hamstries. Some people, who keep only one or two for pets, house them in the parlor, a plan which is probably more popular with hamsters than housewives. They can tolerate hot weather better than cold, and during winter months should be kept where it is fairly warm. You need not set aside a large area for a hamstery, for in 20 cages you can raise up to 100.

It is common belief that hamsters are highly excitable and that they should live where there is little commotion. It is true that breeding females in particular dislike interruptions, and will sometimes kill their family if they are disturbed. High

protein feeds and fresh greens, however, will do more toward raising healthy young hamsters than complete quietness will.

Small scale hamster housing is no problem. One person started with topless five-gallon lard cans. Another breeder who raises them on a larger scale has pens made of galvanized tin. With this type of pen there is danger that moisture will condense on the inside and make these desert natives unhealthy.

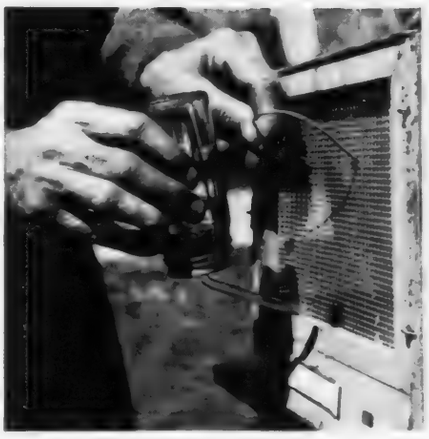
Most breeders prefer cages in which the animals can exercise by climbing around the wire. William Cutter, a retired Midwestern carpenter, raises hamsters as a hobby, and the small pens he has standardized have proven satisfactory over the five years he has used them. They are 10 inches wide, 10 inches high, and 15 inches long. The floor is made of ¾-inch lumber and the rest of the pen is No. 6 hardware cloth on a metal or wood frame. If a larger hardware cloth is used, they could bite fingers that happened to touch the other side of it. The wire is always placed on the inside of the frame to keep the hamsters from cutting their way through it, for they could eat their way through a two-by-four if given half a chance.

Cutter's experience has shown that his cages are large enough for a female hamster and her litter. A larger size will do no harm. Breeding females will appreciate and perhaps do better in a pen that has 10x20 inches floor space. On the inside, around all of the walls, is a strip of glass or metal about two inches high to keep bedding and feed from sifting out. The door takes up most of one end and is also made of No. 6 hardware cloth. These cages are inexpensive, serviceable and easy to build in the average home workshop. A man of average height can stack them six or seven high and have no trouble reaching the top ones.

How to Care for Them

Hamster raisers have discovered that their stock can go without being watered if they are fed plenty of green feed with high water content. Most of them agree, however, that it is best to have water before hamsters at all times for they drink a lot of water when they can get it.

There are two ways in which hamsters are watered. One is by placing a small jar, such as those that face cream comes in, in a corner of the cage and wiring it in that position. A ladder of hardware cloth should be inserted from top to bottom so young ones can climb out when they fall in. The better way to water is with bottles fastened to the outside of the pen with a tube reaching from it into the cage. Pop bottles or small bottles purchased from a laboratory supply house serve the purpose. Get rubber stoppers to fit the bottles, and drill a hole in them slightly smaller than a 5/16 inch tube. Make the spout from glass tubing that you can also purchase from the lab supply house. Copper tubes have one advantage; they don't get broken.



A WATER BOTTLE fastened to the outside keeps cages from getting damp and young from drowning. The bent glass spout fits snugly through a hole in the rubber stopper.

It's no trick to break five-inch lengths of tubing between the fingers after it has been grooved with a small triangular file. Bend it over a gas flame and fit it to reach into the pens, wiring the bottle in place. Water drips from this spout only when the hamsters drink from the end of it. This arrangement prevents messing the cage, and eliminates the dangers of drowning the young.

HAMSTERS LIKE to be handled. Males make better pets than females for the female may be mean and sassy if she has a litter. Few pets take as little care.

The Hamster Diet

Hamsters eat much the same foods as any other rodent. Plenty of grains, greens, fruits, and some roots should be fed. Make the basis of the diet a high protein content pellet. If this is at least 22% protein, it will help eliminate one of the hamster raisers biggest headaches — cannibalism. There are times when the mother hamster apparently realizes that there are plenty more where these came from and destroys her young. Cannibalism is the result of a poor diet and can be avoided by growers who are willing to give their animals fresh greens and the highest protein content pellet they can get. There is a hog chow on the market with 40% protein that makes excellent hamster feed. There is a similar feed sold for a game bird ration, one for calf ration and another for turkeys, all of which make first rate hamster feeds.

Visit the grocery store occasionally for discarded greens that haven't spoiled, for hamsters enjoy them. Milk and dry bread are treats. Chicken scratch is a good grain feed and you can be liberal with it for they won't over-eat. No grain is needed by these animals if they get plenty of pellets. No feed bowls are needed in their pens, for hamsters, being natives of the Middle East, can see nothing wrong with eating from the floor. It costs from five to eight cents each to feed hamsters for a month. You can sell one adult and get enough to feed 20 others for the next 30 days.

SOMEWHERE in the evolutionary cycle hamsters must have had a tough time for they all hoard food. They carry this to extremes, hiding food from themselves in an 10 x 15 pen. This female will empty her pouches and return for more.

You can feed every second day instead of daily. If you want to take a vacation for a few days, just give them plenty of water, toss in a couple of handfuls of good dry feed and fasten the doors. This is one kind of livestock that doesn't tie a person down.

The Breeding Program

With such rapidity does the hamster turn the pages of the generations that the rabbit and the guinea pig aren't even in the same league. No one has determined the number of young possible from one pair in a single year but the figure has been set at about 100,000. About half that number is tops for a pair of mice.

The gestation period is 16 days. The young are weaned at three weeks and after the mother has rested five or six days she can be bred again. This rapid turn-over makes them valuable in studies of heredity, for their characteristics from generation to generation can be studied within a matter of weeks. A female will have six or seven litters in her life span of two years. The young will start to breed when they are six to eight weeks old. The size of litters varies from four to fourteen, with eight as a good average.

Sometimes female hamsters will go on strike against nature and leave the production lines for a few weeks, and there is little that can be done about it. This is more common during winter months when they're kept in cold pens.

At breeding time, indicated by the female's restless activity, put the female in the male's cage. If she accepts service leave her there for about 15 minutes. If she tries to fight the male take her out and try again the following day. If she starts to fight the male get her out of the pen before she does him damage. It isn't unusual for the female to kill a male, or at least leave him with a good crop of battle scars.

Some hamster breeders keep the pairs together until the female begins to show her size, at which time she gets a pen of her own. Leaving the male with her longer will endanger the life of the young.

Another method of handling this phase of hamster breeding is to have pens large enough for about 10 adults; keep six or eight females and two or three good herd males in this box all the time and take the females out at the first sign of pregnancy. If this plan is followed the breeding pens should get close attention and if the animals begin to fight among themselves they should be separated again. Hamsters are temperamental and sometimes the plan will work while at other times it fails. To really avoid family squabbles among your stock it is best to give every female a pen of her own. After you wean a litter you

(Continued on page 140)

Next move?

There have been some strange, and apparently unrelated moves on this checkerboard. But each one has set in motion a chain of events which reaches deep into many homes across the land.

It reaches into farm homes. During the last 10 years our bill from the farmer and other suppliers of the raw materials that go into General Mills products has skyrocketed to over $275,000,000.

It reaches into workers' homes. During this ten-year period the expansion of General Mills products has caused a corresponding expansion of personnel—from 7,242 in 1937 to 12,000 in 1947. More significant, the total annual income of these workers has gone up from nearly $13,000,000 to approximately $35,000,000, a more than proportional increase.

It reaches into your home. As a customer you have felt or will soon feel the effects of this expansion in better flours for your kitchen and for bakeries, in ready-to-eat breakfast cereals, in timesaving soups and quick-mixes, in plastics made from soybeans, in medicines made from wheat, in one of the finest irons ever designed, in a wholly new kind of pressure saucepan.

Yet during all these years there is one thing that hasn't changed much. That is the rate of profit which General Mills makes on the products it sells you. During the past 10 years this profit has averaged less than 3¢ on each dollar of sales.

By continuing to make more useful products for you, we hope to continue to make more jobs for more people at higher pay, and to return a reasonable profit to our 12,700 stockholders.

That is the next move.

General Mills

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What amount of depreciation to take on farm machinery is one of the fundamentals that the farmer must know to make an income tax return that is fair to himself and the government.

IT'S TAX TIME AGAIN

BY LARSTON D. FARRAR

The art of taxation consists in so plucking the goose as to obtain the largest amount of feathers with the least possible amount of hissing.
J. B. Colbert, circa 1665

NOW that the season for plucking is near at hand for the farmer, he should consider the basis on which his income tax is to be reported. For there are ways in which he can save money.

There are usually some raised eyebrows and sly winks when the farmer talks about paying his share of the taxes, for it is generally believed that the farmer is given preferential treatment. Actually the farmer pays his income tax on precisely the same basis as the city man except for one rather important exception. Whereas the city dweller pays tax on his total income and then may spend a good part of it on food, the farmer is not required to report as income any of the produce raised on his farm which he and his family consume, and this, in these days, is not chicken feed. On the other hand the farmer is not allowed to deduct from gross income the expense involved in raising the food that he consumes.

Though most of us are amazed at the casual way tax experts toss around such phrases as "accrual basis," "expenses against gross income," "capital expenditures" and the like, we should not allow ourselves to be intimidated. After all, they are words whose meaning can be made simple. Preparing a typical farm income tax return is not a complicated task. Uncle Sam does his best to make a simple tax form from the tax laws. But there is still a chance that the farmer will overlook some points he ought not to miss, unless he seeks legal help (and it's sensible to do so in cases where the return involves several thousands of dollars). Every farmer would do well to spend a few winter evenings going over the income tax angles so as to make a return that is as fair to himself as to the government. Since the various laws, rules and regulations regarding tax deductions and percentages change from time to time the farmer would do well to keep abreast of fundamentals of the current tax laws.

Although there is more than one method which the farmer is allowed to use to compute his taxes, the essential problem in each method is to add the income from all sources to arrive at the gross income, and to subtract from this figure the total allowable costs and expenses, to find the net income. From the net income, excemptions and credits are subtracted to find the amount to be taxed.

Ways To Report Taxes

The higher income rate in recent years and changes in income tax laws and regulations make it increasingly more important for the farmer to determine where he stands on taxes and how they affect his plans for the successful operation of his farm.

There are two methods of figuring farm

income, the *cash* and the *accrual basis.* The accrual basis, which is the more complex method, includes four alternative choices of method for figuring the value of crops and livestock. The important thing to keep in mind in selecting the method to be used is that once an income tax has been filed under any of the methods, the farmer must follow this same method from year to year unless he secures the consent of the Commissioner of Internal Revenue to change. This permission can be secured by applying for such change within ninety days after the beginning of the tax year. For some types of farming the difference between the methods of filing may not affect the total amount of tax over a number of years, yet the use of one method may make a considerable difference in tax for a particular year.

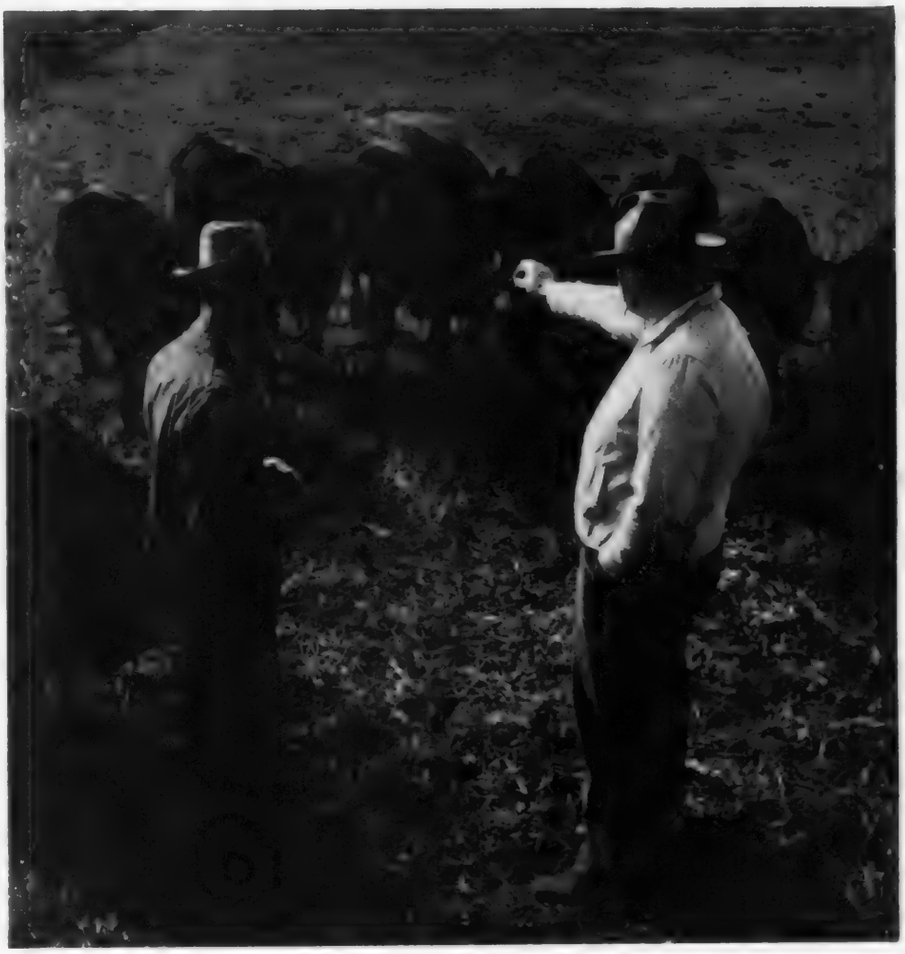
Most farmers who operate small farms are undoubtedly on a cash basis and probably do not keep the records and accounts necessary for reporting on an accrual basis. Many farmers, however, who are able to keep proper records are also on a cash basis, but would enjoy many advantages if they switched to an accrual basis, which generally will show income more accurately and will avoid income distortions which may prove costly when the tax is figured.

In general the difference between the cash and accrual basis of tax reporting is based on the way in which the farmer figures his income.

Reporting On Cash Basis

As the name implies, the cash basis for reporting income consists of figuring on the gross income by adding the amount of cash received from the sale of any livestock or other produce to the profit from the sale of any livestock purchased and sold during the tax year, plus any other income received. The net income is arrived at by subtracting from this figure actual money paid out as deductable expenses during the year. The income distortions mentioned above occur when the farmer holds his crop or any part of it for sale after the beginning of the new tax year. In this event, he might even show a loss for what actually was a profitable year. On the following year if the season's crops were sold within the tax year he would have to declare the income for both years, which might throw him into a higher income and tax bracket. In a like fashion, if the farmer incurred expenses during the year which were not paid until after the end of the tax period he would not be able to deduct these legitimate expenses until the following year.

The cash basis is preferred by most farmers because of its simplicity and because it requires little bookkeeping. The only records that are needed for making out the income tax forms on the the cash basis are the figures showing the amount of cash, or the cash value of merchandise or other property received during the taxable year from the sale of livestock or



LIVESTOCK can be reported either on the Cash Basis or on the Accrual Basis. The latter involves a bookkeeping system which is not as complicated as it appears.

WHEN REPAIRS become capital assets and leave the expense column is a fine and delicate point and interpretation rests with the tax collector in your district.

produce; the profit, that is the difference between the cost to him and the selling price, on the sale of any livestock or other items which he has purchased and resold; and the gross income from all other sources such as rental of teams, breeding fees, rental of lands, work done by himself for another person, etc. He will also need a record of the money actually paid out during the year for expenses whether they were incurred during the year or not.

Reporting On Accrual Basis

The bookkeeping necessary for using the accrual basis gives the farmer a truer picture of his year's operations. It is necessary to prepare an inventory of produce and livestock at the beginning of the tax year, and a second inventory at the end of the year. To arrive at the gross income for the year the farmer needs only to take the inventory taken at the end of the year, add to it the amounts of money realized from the sale of livestock and produce during the year, and subtract from this the inventory taken at the first of the year. Like the farmer who works on a cash basis, he must then add the miscellaneous receipts from all other sources. To find the net income, the deductible expenses incurred during the year are subtracted from the gross income *whether or not the farmer has actually paid them during the tax period.* The portion in italics is that part of reporting the tax that is different from the cash basis.

The accrual method shows more clearly the income produced or earned during the year and the costs applicable to the year's operations. Under the cash method only those transactions completed during the taxable year are included in figuring income or expense.

As may be imagined, one of the major problems which must be solved in working out the inventory, which is the heart of the accrual method, is the value which is to be given the various items on the list. To meet this problem the government offers four different methods of valuing inventories, one of which is applicable to livestock only. The first two methods are those used in ordinary business practice, which is either the original cost or value on the present market, whichever is lower. If the cost or market basis of valuation is used it must be applied to each item in the inventory.

Farm - Price Method

To help solve the difficulty of valuing the produce or livestock raised by the farmer the overnment allows him to use the farm-price method. The basis for this figure is the price that is being currently bid in the local market for the volume of produce or livestock which the farmer normally sells. If he is not able to secure a current bid price, the farmer must use the best available evidence of a fair market value. Recent sales or purchases of the produce by himself or his neighbors will serve as a guide. After finding the current market price the farmer is allowed to deduct from it the "cost of disposition" which would include broker's commission, freight or drayage charges to the nearest market, and other handling expenses. This gives him a current "farm-price."

Unit - Livestock - Price Method

The fourth method of arriving at an inventory value is applicable only to livestock. This method was adopted December, 1944, in order to overcome some of the difficulties met by livestock raisers in determining the cost of their animals. In cases where an inventory is kept on large numbers of animals as part of the accrual basis the farmer is allowed to assign a value to the individual animal within a class, before it reaches maturity, based on the annual cost of raising it. Thus a figure of from $15.00 to $18.00 (or whatever the farmer figures the actual cost to be) might be assigned to a calf as the cost of raising it during its first year. After the second year another $10 or $12 is added to its value and so on until it reaches maturity. Upon reaching maturity each head of livestock is held on the inventory at a constant valuation. In this way the farmer need only count the total number of animals in a given class, such as bulls, heifers, etc., the number of two year olds in the same classes, and the number of full grown animals, all figured at the time the inventory is made. This method also may be used in valuing all immature animals, whether purchased or dropped on the farm.

Gross Income

The income of a farmer, like that of any businessman, is made up of what he produces or buys for eventual sale, such

(Continued on page 122)

PAINT AND REPAIRS on the barn or any building used in farm operation can be deducted as expenses. Improvements or repairs on the farm dwelling are not deductable.

ORNAMENTAL CUPOLAS, flag poles, fancy fences, and barn door murals may add elegance to a farm but the tax collector may doubt their status as deductable expenses.

OF THE MANY farm weeds the Daisy is one of the least annoying and certainly among the most picturesque. When a field is put in rotation they are usually eliminated. Stubborn clumps can be cleaned out with a single application of 2-4-D.

6-YEAR ROTATION

BY ROBERT H. RUMLER

THE CITY MAN who spent a week-end on a farm and looked down his nose to remark that "the lead pencil is the least used tool on the farm" hadn't been exposed to farmers like some in Lycoming County, Pennsylvania. Many of the better farmers there have talked and planned and spent a good many nights figuring out a new basis of crop selection and planning. One of the things they have come up with is a six-year rotation to replace their three- and four-year ones.

Typical of the discussions pro and con on the six-year rotation was the one that started after a big Sunday dinner in June at the Mutchler place. The men had been walking around looking at the pigs and admiring the new milking machine with its stainless steel equipment. Then the talk shifted to crop prices and whether it was better to cash crop or to feed livestock. One of the men summed up the feelings of the "cash cropper" when he said, "I sleep at night when you livestock men are up playing nursemaid to a sick heifer. My plan is simple; no complicated figures. I grow all the crops I can, at the lowest possible cost. I keep my soil in good shape and I haven't any trouble with erosion. I watch the market and try to sell when the price is high.

"But look at the way you livestock men have to work," he said. "When your hogs and cattle get to the right weight you have to sell. And if you hit a crazy market like you have had this year it seems like your animals are always ready to sell at the wrong time. When hogs hit $30.00 you didn't have any to sell. You have some bad luck, get several reactors to your Bangs' tests and your profit is wiped out for the year. I'll take my gamble on the seeds and the weather; that is enough for me."

The Mutchlers are livestock men, father and two sons; they make use of their love of animals and their ability to handle them. They have managed their farm on a crops-for-feed basis. Son Eugene said, "I am just enough of a Pennsylvania Dutchman to believe that our land is going to be in better shape than a cash cropper's is, for no crop ever leaves this farm that couldn't walk off on its own four feet. What's more our animals are taking on part of the job of picking and combining and that cuts down our labor cost. Raising livestock takes a lot of good alfalfa and ladino hay and that just naturally works into a long crop rotation."

The Mutchler's six-year rotation plan revolves about the idea of supplying feed for their livestock. Eugene, the older son, in planning the rotation has taken into consideration the improvement of soil, fertility, and erosion control. The three-year stands of alfalfa and clover which this rotation uses have been a big

help with these two problems.

Since half to three-quarters of all money mid-western farmers receive comes from livestock, a crop program that is planned for feeding the farm animals will interest many owners. Lots of farmers have wanted to work out such a program but the discouraging first snag that they hit is the question, "Where do I start?"

You begin, of course, with a certain number of animals and an estimate of the feed needs per day and then figure the year's requirements. See Table 1. But there are ways of juggling the kinds of feed so that the animals get the most nutrients, while taking the least out of the soil. And in addition, some crops are easier and cheaper to raise. Some are better suited for your soils. The two basic factors to be considered are (a) the Total Digestible Nutrients of crops (TDN for short) and, (b) their Protein content. It is important to know the TDN in any feed because it is the measuring stick for the approximate percentage of the feed weight which is capable of producing heat, energy and growth in an animal. Included in the TDN percentage are the digestible portions of the organic nutrients, protein, carbohydrates and fat. Although the Digestible Protein figure is included in the quantity of TDN, the livestock man needs to have it available as a separate percentage figure. Protein has special uses which come from no other nutrient. The proteins, which are defined as nitrogenous compounds and are composed of a variety of amino acids, are essential to all life. In plants, protein is usually concentrated in the leaves and the reproductive parts, or seeds. In animals it makes up the protoplasm, the cell walls, the muscles, the internal organs and a great part of the outer tissue such as the hide, wool, horns and feathers.

Like schoolboys, some crops get an "A" average, others just slip by with a "C" and some are a complete flop at producing TDN and Digestible Protein. The way a farmer selects his crops may mean the difference between profit and loss on the farm.

The basis of measuring what TDN and Digestible Protein crops produce is available in Tables of Feed Analyses which can be obtained from county agents or livestock specialists at agricultural colleges. F. B. Morrison's book, "Feeds and Feeding," lists the TDN and Digestible Protein content of just about every plant, crop and feed ever heard of. Such exotic feeds as Egyptian Clover and Sesame Oil Meal are tabulated with a straight face.

To start out on your own farm plan based on a feed-for-livestock program, get your table of feed analyses from whichever source is most convenient, set aside an evening when the children can be put to bed early, turn off the radio, give your wife a copy of *Lydia Bailey* to read and go through the tables checking the TDN and Digestible Protein content of crops that are grown most successfully in your neighborhood. The result of the Mutchlers' first evening of hibernation are incorporated into Table 2. They later added cost figures which were obtained from the Pennsylvania Extension Service.

Feed Isn't Measured in Bushels

It is significant that the number of tons or bushels of a particular crop produced per acre does not necessarily indicate the actual amount of feed nutrients that were produced. Wheat may produce half the number of bushels per acre as oats, yet the total nutritive production of wheat per acre is usually higher in both terms of Total Digestible Nutrients and Digestible Protein than oats. The "sleepers," which have already been discovered by many farmers who are specializing in grass crops, are alfalfa and ladino clover. They are usually higher producers of feed nutrients on a per acre basis than small grains. The difference in alfalfa hay and clover and timothy hay is equally striking. One may expect alfalfa hay to produce at least a ton more per acre than clover and timothy. However, the increase in Total Digestible Nutrients and Digestible Proteins in alfalfa is proportionately greater, almost doubled for TDN and tripled for Digestible Protein.

The last two columns of Table 2 are particularly important to the livestock man. Not only must the total amount of feed produced per acre be considered, but also the cost of producing that feed. Generally speaking, the cost goes down as the total production of feed nutrients increases on a per acre basis. This, however, is not the case when alfalfa hay is compared with corn on a TDN basis. In this case, every dollar spent in producing the 100 lbs. of TDN in the form of alfalfa hay is equal to $1.43 spent in the case of corn for feed. Most livestock men will do well to take a long glance at the last column on the relative cost of Digestible Proteins produced by the various crops grown in this North Central Penn-

AS MOST FARMERS have found out, the feeding value of a crop isn't measured in the heighth of the stand. If you are a livestock man the decision on growing a crop should be based on its per acre production of digestible nutrients, how well it grows on farms in your neighborhood, and the cost of its production.

TABLE 1
INDIVIDUAL DAILY REQUIREMENTS OF LIVESTOCK[1]

Class of Livestock	*T. D. N.*	*Dig. Prot.*	*T.D.N. and dig. prot. needs may be met with these feeds produced by the 6 year rotation[2]*			
			Alfalfa Hay[3]	*Corn Silage*	*Corn*	*Oats*
Dairy cow weighing 1200 lbs. and giving average of 35 lbs. of 4% milk, equivalent to 10675 m 427 f per 305 days	20.63	2.45	20 lbs.	25 lbs.	5 lbs.	3 lbs.
Dairy heifers (400 lbs. av. wt.)	6.4	.85	5 lbs.	.....	3 lbs.	3 lbs.
Feeder cattle 700 lbs. (baby beef class)	13.0	1.65	6 lbs.	5 lbs.	10 lbs.	2 lbs.
*Pregnant guilts 250 lb. avg.	4.0	.53	0.5 lb.	.....	3 lbs.	1.5 lbs.
*Growing and fattening pigs 100 lbs. avg.	4.0	.55	Pasture	.....	3 lbs.	1.5 lbs.

*Tankage will also be needed to supplement these feeds for greater efficiency.

(1) Figures based on recommended feeding standards of F. B. Morrison.
(2) These figures must be considered as specific for the class of livestock suggested—dry periods for dairy cattle, finishing periods for beef, etc. would alter individual requirements, but the herd would generally follow the averages over a period of time.
(3) Ladino clover pasture would probably replace most of the alfalfa hay during the pasture season.

TABLE 2
PER ACRE COMPARISON OF NUTRITIVE PRODUCTION OF CROPS

Cost	*Rate of Production (2) per Acre*	*T. D. N. (3)*	*Digestible Protein (3)*	*Index Cost 100 lbs. T. D. N. (4)*	*Index Cost 100 lbs. Digestible Protein (4)*
Alfalfa hay*	2.5T	2266	477	1.00	1.00
Clover and Timothy hay....	1.5T	1440	132	1.24	2.85
Corn (grain)*	50 bu.	2343	207	1.43	3.40
Corn (silage)*	10T	3740	260	1.07	3.25
Oats	45 bu.	1030	136	1.67	2.66
Wheat	25 bu.	1254	170	1.42	2.21
Ladino Clover Pasture* (1)	10.2T	4800	1344	0.18	0.14

(1) Production rate based on Pa. Extension Demonstrations
(2) Production rate based on averages for land of equal fertility
(3) Figured on average analysis according to "Feeds & Feeding" by F. B. Morrison
(4) Based on Cost of Production figures, Pa. Extension Service

sylvania county. Digestible Protein costs the livestock farmer the greatest single cash outlay. In the column headed "Digestible Proteins," crops can be spotted that are not giving high yields of protein per acre. It can be seen that the cost per pound of protein production with certain crops is excessively high compared with other crops.

We have always considered good clover and timothy hay as a reasonable satisfactory roughage for livestock and particularly for dairy cattle. On the other hand, the production figures and cost figures indicate that, when compared with alfalfa hay, our old friends clover and timothy make a poor showing. And so it may be with many other crops.

A similar listing of crops, rates of production, nutritive production, as well as cost, can be made for any farm or general farm area. The list of crops and average production of each is generally known. To obtain the TDN and Digestible Protein figures for each crop, multiply the pounds of that crop produced per acre in your locality by the average analysis of that crop as obtained from F. B. Morrison's book, "Feeds and Feeding," or from Extension Service publications devoted to average feed analysis. Information on cost of production will vary considerably on individual farms; however, averages may be obtained from the State Extension Service. A chart like Table 2 will serve any livestock farmer as a valuable planning guide.

The "Star" Crops

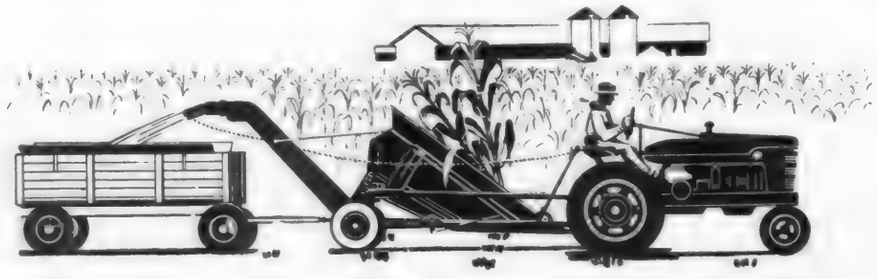
In planning the Lycoming Dairy Rotation, a table like this was used. After carefully studying each crop and its rate of production, the most efficient crops were starred, indicating an "A" crop. These, then, were the crops which the farmers wanted to include in their cropping system, for they showed every indication of giving the most value for each acre devoted to crop production and each hour spent in tilling the land.

The next step in the development of the new cropping plan was to work the starred crops into a satisfactory rotation. Because of the high nutritive production of alfalfa and its relatively low cost of production, it seemed logical to use it as the basic crop. Alfalfa, however, is not a one-year crop, for in some areas it produces well for three, four or more years. Therefore, alfalfa was allowed to remain for three years in order to get maximum returns from the investment of time and money in the establishment of the seeding.

The second most important crop of the group was corn. Although it cost slightly more to produce than wheat, corn gave a greater feed return per acre, thereby increasing the efficiency of land utilization. Then, too, corn was a natural crop to follow alfalfa sod. So two years of corn followed three years of alfalfa, giving sufficient acreage of corn so that a portion of each crop could be used for silage. Winter cover was provided by rye grass, which was plowed under in the spring for green manure.

This made use of the high nutritive producing crops, with the exception of ladino clover pasture, but left a blank in the rotation for a transition crop from corn back to alfalfa. For this job oats was selected. Being a spring-seeded crop in most areas, it would not interfere with the corn harvest; it is a reasonably satisfactory nurse crop for alfalfa, and it makes an excellent feed for livestock when mixed with corn.

By following this reasoning the basic rotation of three years alfalfa, two years



LEFT: THE ENSILAGE HARVESTER is a combination of a corn picker and an ensilage chopper. One man on a tractor can operate the rig. The corn is cut when it is at the best ensilage stage, chopped and blown into the wagon, hooked on behind. The time from standing corn to packing in the silo need not be over an hour, ideal timing for best feeding value.

ONE OF THE PEAKS of the summer work load on the farm used to be "Silo Filling Day." Modern machinery has reduced it from a job that required all of the men in the neighborhood to a three- or four-man operation. Silage is low-cost, highly nutritious feed for all kinds of livestock. The corn, grain and stover is all turned into succulent feed, for use at any time in the year. The storage space for hay having an equal amount of feed value would take a haymow five times as large.

TABLE 3
THE LYCOMING DAIRY ROTATION

Field	*1947 Crop*	*1948 Crop*	*1949 Crop*	*1950 Crop*	*1951 Crop*	*1952 Crop*	*1953 Crop*
A	Alfalfa	Alfalfa	Corn	Corn	Oats	Ladino Pasture	Ladino Pasture
B	Corn	Corn	Oats	Alfalfa	Alfalfa	Alfalfa	Corn
C	Alfalfa	Alfalfa	Alfalfa	Corn	Corn	Oats	Alfalfa
D	Corn	Oats	Ladino Pasture	Ladino Pasture	Ladino Pasture	Corn	Corn
E	Ladino Pasture	Corn	Corn	Oats	Alfalfa	Alfalfa	Alfalfa
F	Oats	Alfalfa	Alfalfa	Alfalfa	Corn	Corn	Oats

TABLE 4
NUTRITIVE PRODUCTION PER YEAR FOR TWO ROTATIONS
(100 ACRES)

	Total Pounds T. D. N. (1)	*Total Pounds Digestible Protein (1)*	*Man Hours Labor (2)*
Lycoming Dairy Rotation	265,100	47,035	2,124
Usual Four Year Rotation	160,057	16,523	2,032
Difference	+105,043	+30,512	+92

(2) Developed from Pa. Extension Service Records.
(1) Developed from table 2.

TABLE 5
100-ACRE FARM YEARLY FEED REQUIREMENTS[1]

	Number Head[2]	*T.D.N.*	*Dig. Prot.*	*Crop Needs in Pounds*			
				Hay	*Corn Silage*	*Corn*	*Oats*
Dairy Cows (365 days)	24	180,719	21,462	100,800[3]	126,000	43,800	26,280
Dairy Heifers (365 days) for herd improvement	10	23,360	3,103	14,375[4]	.....	10,950	10,950
Feeder cattle (300 days feeding period)	10	39,000	4,950	18,000	15,000	30,000	6,000
Guilts for farrowing (185 days) selected from spring pig crops...	3	2,200	294	277	.....	1,665	833
Pigs (180 days feeding period)	21	15,120	2,079	.....	.....	1,620	810
Total Feed Requirements		260,399	31,888	133,452 (66.7T)	141,000 (70.5T)	88,035 1467 bu.	44,873 1282 bu.
Total Expected Feed Production (from Table 4) for 100 acre farm...		265,100	47,035[5]	74.9T[6]	70T	1315 bu.[2]	817 bu.[7]

(1) Obtained by multiplying individual daily feed requirements by estimated days on feed and number of head of livestock on feed. Classes, weight and production of livestock in table 3 are used as averages, of course all cattle in a herd would not produce 35 lbs. of 4% milk each day of the year, nor would feeder cattle and growing dairy heifers remain at suggested weight. For purposes of estimating feed needs these averages were used.
(2) Could be increased as level of soil fertility is raised or if average crops yields are greater than those shown in table 2.
(3) 210 days on hay, 155 days on pasture.
(4) 5 calves on hay 365 days—5 on hay 210 days, pasture 155 days.
(5) Surplus created by high protein pasture.
(6) Excess hay may be used with ladino clover for pasture (hogs, etc.).
(7) Table 2 indicates that oats usually cost less to buy than to raise. It was included in rotation principally as a nurse crop.

Results of the use of six year rotation for livestock farms should be that more animals can be carried on a farm and hard-to-work fields and thin, steep pastures can be returned to profitable grazing and timber.

corn and one year oats was established and to check the rotation plan to see whether it supplies the feed needs of all the livestock on an individual farm, the average feed needs are listed and matched against the starred crops on the chart. It will generally work out that the variety of crops in this rotation will take care of about all the feeding requirements. Good quality alfalfa hay supplies approximately 40% of the TDN and 80% of the Digestible Protein requirements of the dairy cow, and the balance of her ration comes from corn and cob meal ground and corn silage. If minerals are needed the mineral supplement is added when the feed is mixed. Good producing cows will repay the use of additional protein supplement. The same feeds also will apply to beef herds, sheep and to a certain extent, hogs.

Not to be forgotten is another starred crop, ladino clover pasture. This can be used to replace any desired portion of the alfalfa acreage. With improved permanent pastures, little or no ladino pasture may be needed except during warm summer months. Where permanent pastures are not satisfactory, it may be more economical to use ladino clover as a rotation pasture.

The finished crop plan is shown in Table 3.

On the average livestock farm it will probably be satisfactory to seed ladino clover with a grass such as orchard grass in the oats every third year. When it is not needed for pasture it can be cut for hay or grass silage.

Running the Rotation

The management of the Lycoming Dairy Rotation is as important as the development of the rotation itself. It is now generally known that corn planted after a legume sod, and one of the best is alfalfa, will give greater yields than when following any other type of crop. In Iowa tests, this increased yield amounted to as much as 20 to 30 bushels per acre as compared to other fields which followed wheat, oats, combined soy beans or corn. In the fifth year of the rotation corn follows corn; however, a winter cover of rye grass is seeded in corn at the time of the last cultivation. It is plowed under the following spring. This will reduce erosion losses, maintain soil fertility and organic matter in addition to having every acre of cropland on the farm under sod throughout the winter. Oats stubble of course, would have a new seeding of alfalfa and grass to protect the ground during the winter.

Fertilization of the crops suggested in the Lycoming Dairy Rotation or any other rotation developed according to the same plan should be consistent with the recommendations of the Experimental Stations for the crops grown and the soil types; 300 pounds of a 3-12-12 fertilizer per acre for corn grown on light colored soil with legumes in the rotation. For established alfalfa on the same soil, 300 to 500 pounds

THE FIRST FEEDING TABLE for animals was devised in 1810 by Thaer in Germany. He gave rough equivalents; in his table he listed 91 pounds of clover hay, 625 pounds of mangels, 200 pounds of potatoes as equal to 100 pounds of meadow hay in feeding value. Today from scientific feeding tables it is possible to figure almost to the pound the daily feed requirements of farm animals. Extension Service representatives at state universities and county agents can provide this information. The 6-year rotation shown in the chart on the opposite page, was devised from the feeding tables of F. B. Morrison's book "Feeds and Feeding" to supply the best and cheapest feeds to dairy cows and other animals on farms in Lycoming County, Pennsylvania.

of 0-12-12 is an average; and when small grains are used as nurse crops, they should have 350 pounds of 3-12-12.

Of course, these rates of fertilization can be taken only as averages since a number of factors must be considered before specific recommendatiens can be made.

There are many additional advantages to this system of crop rotation. From the standpoint of erosion control, the six-year rotation is ideal; the long stands of alfalfa-grass will hold the soil. Where strip cropping is used, the hillsides will be in sod, and the large percentage of sod in the rotation aids in reducing soil losses, helps to maintain soil fertility and organic matter, produces good soil tilth, in addition to increasing the yields of succeeding crops.

Another advantage of the rotation is its flexibility. It can be shortened or lengthened to meet varying feed needs. Corn can be reduced to one year if smaller quantities are needed or the yield is extra high. The same can be done with alfalfa, or, if the crop is growing well, it can be allowed to continue for a year or two longer. It is also possible to substitute winter-seeded small grains such as wheat and barley for the oats in instances where corn is taken off for silage or harvested early enough to insure a good start of the grain before cold weather.

Wartime agriculture made us extremely conscious of farm labor requirements. For a profitable operation we need to get the most out of each hour spent in the field. It was found in the Lycoming Dairy Rotation that on an average 8 man hours of labor will produce 1000 pounds of TDN, but a typical four-year rotation will require between 12 and 13 hours. See Table 4.

The comparison of the yearly feed requirements for a 100-acre farm with the expected production under the 6-year rotation is given in Table 5. This was the chart of a year's operation, the result of intelligent planning and figuring. It takes care of all the livestock feeding except for a small shortage on corn and oats. It gives a third greater TDN production and two times greater Protein production. And both of these expensive-to-buy livestook feed essentials were produced with less than 100 additional man hours.

The farmer who can put his finger on a savings like these by means of several evenings of study and planning should be able to spend less time making ends meet, and more making bank deposits.

THE BINDLESTIFF

BY CY LA TOUR

WHEN the July heat starts to shimmer over the western fields and the vast seas of green wheat turn to a golden yellow, an army of men carrying bundles slung over their backs move in to make the harvest. They come from every state to thresh the grain and move it away to market. When the long day is done they wolf a tremendous meal in the chow wagon or mess house, unroll their bundles on a heap of straw, and sleep like dead men until the dawn.

They are bindlestiffs and they are a race of men apart. Their worldly possessions done up in a roll—a safety razor, a clean shirt, a pair of socks, a greasy pack of cards, and their bedding—they follow the harvest north to the very edge of Canada and beyond. After the wheat harvest they move on; sacking the beans, threshing the rice, and pulling the sugar beets. Without them, America would not eat so well.

Some are specialists, like the "jigger" who stands in the "dog house" of the combine, sacking the grain in air so thick with flying dust that you could cut it with a knife. There are mechanics among them who repair and operate the harvest machinery. There are drivers and cooks and just plain stiffs, the field hands. They work ten or twelve hours a day, often longer, while the harvest is on, for the highest wages paid farm workers in America. A "jigger" makes from $15 to $20 a day; the boss of the combine, the separator man, gets the top money, up to $30 a day. The other four members of a six-man combine crew get $15 a day for the three months of the harvest season. Twenty years ago when stationary threshers were more common than they are today and horse-drawn wagons were used to bring the grain from the field to the thresher, crews of thirty to sixty men were employed. Those were the days when the cook of an outfit was the top wage man; he earned up to $14 a day. The wage scale for field hands ran upwards from $5 a day, high for those times when mid-west farmers were paying $1.50. Many a farm boy dreamed of the gold in the western fields in those days.

The word, "Bindlestiff," originated in the midwestern grain belt. Men who harvested the crops carried their beds and belongings rolled up in a canvas which served as a ground cloth at night and a pack when they were on the move. Bindlestiff is a corruption of "bundlestiff," derived from the bedding rolls. Sometimes the word is shortened to "bindles" or "stiff." John Steinbeck has immortalized the bindlestiff in his "Of Mice and Men" and Lennie and his pals are familiar types in the harvest fields.

The bindlestiff is not to be confused with a tramp or bum. A tramp will not work — a bum can't work, but, on the other hand, a hobo will work. There are sharp class cleavages among those who live on the road. Hobos have itching feet, but many of them are clever men.

Bindlestiffs work literally day and night during the harvest season of three or four months. They accumulate a sizeable "roll," enough to see them through until the next harvest. Most of them are frugal, real hustlers when the work is on.

Many of these men, and there are upwards of a million and a half of them, belong to two organizations, The International Itinerant Migratory Workers Union, or its competitor, The Hobo Fellowship of America. The lower order of bindlestiffs become tramps; the alcoholics are bums.

Bindlestiffs and hobos have an official organ, a sizeable newspaper, The Hobo News, published once a week. The circulation is 80,000 weekly, with headquarters

THE BEAN HARVEST is finished, the packs are rolled, and the bindlestiff is off to new fields and new harvests. There's a good deal of gypsy in him, but he pays his way.

←

THE BOSS OF THE COMBINE, what every bindlestiff aspires to be. The boss must not only be able to out-work every member of his crew, but he must know how to control their rugged individualism.

THE RIGHT HAND of Phil Rys, Camarillo, California, champion jigger, who sacked 100,000 bags of beans in ninety days. The horny nails and the sole leather callouses are the result of thirty-five years work in the harvest fields.

located at 115 West 52nd Street, New York City. The publication made its first appearance in August, 1934, and was started with a capital of thirty dollars by Pat Mulkern, his wife, Lucy, and Otis O. Rogers, the Boomer Poet.

The bindlestiff may have a home and a family and odd jobs to which he returns when the harvest is done. He returns year after year to the same harvests and takes a roll of bills home to tide his family over the winter. Many are homeless, single men, who love the open road and the freedom of the harvest fields. They winter through on odd jobs and panhandling and return to the harvest broke. They find their pleasures in the saloons on Saturday night when they blow their week's wages on straight whiskey and games of chance. Western state police who have to do with the bindlestiff in his moments of recreation are unsympathetic. "They are a bunch of bums," they say. "Hobos, Weary Willies, who work just long enough to get money enough to buy enough cheap wine to get stiff." The sweat and the dust and the heat of the harvest are lost on the police. They have little occasion to know about the honest and reliable majority of the craft who ride the buses back home after the harvest with their earnings in their pockets.

Phil Rys is a bindlestiff's bindlestiff. For thirty-five of his fifty-nine years he has traveled from ranch to ranch, carrying his roll on his back, sleeping in the harvest fields. Born in Camarillo, California, he has never married.

Rys is the world's champion bean sacker. He has worked in the bean fields of California ever since he can remember and last year he sacked well over 100,000 sacks. His hands are the trade-mark of the calling. His fingers are worn flat and square at the ends from the constant handling of the heavy bags at the loading chute; layer on layer of thick, horny callouses cover palms and fingers, and from the constant dryness the callouses are cracked and broken; friction of burlap against flesh has added a polish that glistens like a coat of varnish. There's no time to doctor hands, so the "jigger" keeps mechanically at his work. Muscles become set so that it is scarcely possible to open the hands after a day's work. In the morning they seem like a member apart from the body were it not for the ache of cracked callouses and broken nails.

When fog prevents an early morning start, harvesting crews, by the aid of great lights, work way through the night. The crop must be harvested. Human endurance is matched against time and natural elements. Food is gulped at midday, the quicker to return to the job.

Above all else, water is the greatest need of a bindlestiff in the harvest fields. Water jugs thickly wrapped with damp burlap are always kept on the combine. In some harvest fields water boys are employed. Water is the most effective antidote for

LIKE A SOLDIER, the bindlestiff has worked out his minimum requirements. A mattress of lima bean hulls is next to a Simmons.

dust but most bindlestiffs help out with a chew of tobacco. Sliced lemons are often placed in the drinking water to prevent cramps and reduce thirst. Sometimes as a reward for a job well done there will be a keg of beer in the big chow wagon.

A bindlestiff travels and works on his stomach. Food is served in the mess house or chow wagon in unbelievable quantities; not fancy but filling, and it sticks to the ribs. Food is the only pleasure the bindlestiff has during the harvest season and he demands his own version of what a man should eat. He wants roast beef and pork, mountains of mashed potatoes swimming in gravy, and an ever-filled coffee cup. Pie is mandatory and a rancher's reputation often rests upon the quality of his pies. A bindlestiff is not persnickity, but Paul Bunyan would not scoff at his appetite.

The bindlestiff hasn't much fun during the harvest. Sometimes when he isn't too tired he takes Saturday night off in the nearest town. He may play a few minutes of poker or seven-up in the evening before he turns in for his short sleep. Mostly his life during the harvest is made up of working, eating and sleeping. When winter comes he loafs; and wonders how many of the old hands will turn up next harvest.

The New Deal studied the bindlestiff as a social and economic problem and reformers are always working on him. To the bindlestiff himself life is reasonably simple, and he's reasonably happy. His philosophical attitude toward life and living—work like hell during the harvest, rest like hell during the long winter months—is essentially nature's way. He likes the way he lives—and he gets the harvests done.

PHIL RYS works in the heated dust of the dog house. As sacks fill he ties them, sets them aside, hooks another sack at the chute.

It is morning on the Laramie plains in Wyoming. The shepherd with his staff and faithful Border Collie rests while the sheep are grazing contentedly on grama grass. In the foreground of the flock is a black "marker"; one black sheep to each 50 head permits a rapid calculation as to whether the band is all accounted for.

The Golden Hoof

BY J. F. WALKER

WHEREVER man has gone he has taken his flocks with him. From the steppes of Russia, down through the barren wastes of Bokhara and Arabia, in the lush savannas of South America, the semi-arid interior of Australia, or the desert area of our own country, the imprint of the golden hoof is found.

Many are the variations in type and character. It may be the fur bearing Karakul or the woolless fat tail of North Africa, whose chief value lies in its forty to fifty pound fat tail, often so heavy that small carts are made to support its weight, an apt illustration of the old nursery rhyme 'dragging their tails behind them.' It may be the small Iceland sheep with its pound of superfine undercoat and a hair outer one, or the Merino of our western regions and Australia with fleeces up to thirty pounds in weight.

←

AGAINST A BACKGROUND of the 2000 year old ruins of the cliff dweller village in the Canyon de Chelly in the Navajo Reservation of Arizona a flock of sheep is doing nicely on the sparse Indian Wheat, or bunch grass. With them is the inevitable goat leader, whose upturned tail gives him away in any herd.

And with the flocks was always the shepherd, for sheep are defenseless, so much so that they have come to be the symbol of all defenseless things. The shepherd's task, was once highly honored. The lessons David, the King, learned on the Judean hills in caring for his father's flock, stood him in good stead when called to lead and provide for the well being of his people.

No more beautiful bit of literature was ever penned than the Twenty-third Psalm when David, doubtless thinking of his boyhood, compares the Lord to a shepherd. In it is outlined the whole of the shepherd's duty to his sheep. "The Lord is my shepherd; I shall not want. He maketh me to lie down in green pastures. He leadeth me beside the still water. Thy rod and thy staff, they comfort me."

Here is summed up the job of the shepherd, to find food and water and protect the flock. The rod was to defend the flock from wild animals, generally wolves, coyotes, bears or dogs, and the staff with its curved end served to catch any of the flock that needed attention. The shepherd's crook is still the emblem of his job and in all the years no better tool has been devised for the purpose it serves.

The duties of the shepherd vary according to his pastures. He may fold the flock at night in a corral, or herd them into a bed ground near his camp. In either case he has the sheep where they can be watched and guarded by fences or his faithful dogs. He may stay for weeks in a given place or be forced to change pastures daily.

In the morning he starts the band out to the fresh pastures, arranging so they can get to a supply of water. In the long stretches of day you will find him on the top of some hill where he can watch the flock or, if he can trust his dogs, he may be taking a nap under some shade tree or cleaning up his camp.

His whole thought is the care of his flock. The records are full of shepherds that have lost their lives in protecting their flocks.

What manner of man possesses these qualities? It certainly requires a peculiar temperament to isolate oneself from companionship and live in deserts or mountains with sheep and a dog for companions. He must be a man who has infinite patience, a love for his charges and a pride in their well doing, as well as an ability to withstand solitude.

The shepherds of the United States have

largely come from four sources. They differ widely in their origin yet each possesses the qualifications necessary to the job. Most of the early western shepherds were Scotch. Raised in the bleak cold hills of that country, and born with a disposition to endure all adversity with courage and determination, they readily adjusted themselves to the northwestern ranges. With generations of shepherds behind them and a natural love for livestock, they made ideal men for the work.

Another group came from the Pyrenees Mountains, between France and Spain. These were the Basques, a hardy mountain race, that may have early been trained in the profession by trailing the Merino flocks of the Grandees of Spain up from the lowlands into the mountains, some 150 to 200 miles each Spring, and back again in the Fall. Twenty-five hundred Basques came to America at one time to become shepherds. They are now scattered over the rocky western pasture lands.

The third source of shepherds was Mexico. When the Spaniards first came into Mexico they brought sheep with them and employed Mexican Indians as shepherds. The Spanish Catholic priests who founded missions along the California coast, started training the native Indian tribes in the duties of caring for the flocks, and the Indian descendants have carried on.

Our All-American shepherds come from the Navajo Tribe of the Southwest. Originally a war like nation, they raided the Pueblo country and carried off many of their women as wives. These Pueblo women were skilled workers in pottery and blanket weaving and one finds the Navajo taking up the latter art until it became a tribal profession. Blankets required wool, and wool meant sheep, so the Navajo became a shepherd.

There are a few "musts" in managing range flocks. They must flock together and not all breeds do so. If sheep are scattered all over the landscape it makes an impossible job for the shepherd to watch and care for them. A prominent Western rancher one said, "I purchased forty head of a breed I thought might be successful in the west. I turned them out and inside of five hours they were on forty different hills. I knew then they would not do."

One breed stands out in its natural instinct to stay together. That is the Merino. This habit was doubtless bred into it through the years it was driven back and forth from the mountains to the plains each Fall and Spring. Only those that stayed with the flock survived and eventually the habit became a fixed one.

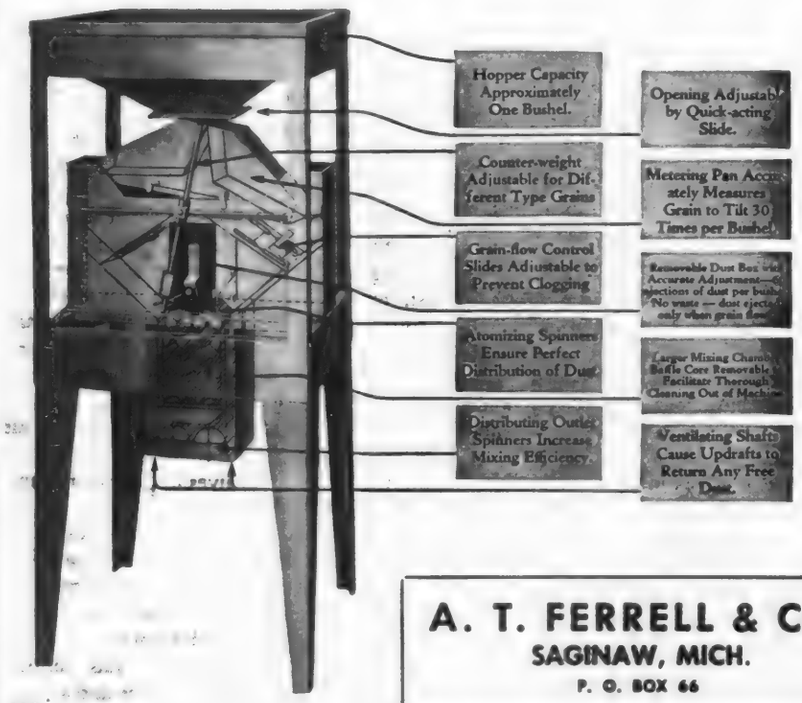
Many bands of sheep subsist entirely on the forage of the range. In winter supplementary feeding at times must be resorted to, and the hay wagon carries out hay or maybe some pellet concentrates for the flock. Blizzards may block the trails and today the airplane has been used to fly in feed in extreme cases.

The role of the shepherd is a vanishing one. The Scotch or Basque shepherd's son is either a flock owner, or has changed jobs. The Mexican is turning to the crop lands, and only the Navajo seems content to follow the sheep trail.

From the West comes a constant cry "Where can we get help?" It may be necessary to fence all the range, as is being done in Texas and New Mexico. It may mean permitting immigration of herders from Europe or it may mean further depletion of western flocks. The phrase "The Golden Hoof" is perhaps the key to the answer. It dates back to early Roman history and doubtless referred to the fact that sheep contributed so much to the wealth of nations. The quiet, independent, lonely life of the western shepherd has attracted few apprentices, but the golden hoof will probably coin the inducement to preserve the skill of the shepherd.

★ ★ ★ ★

Be Ready TO TREAT 'EM RIGHT


Hopper Capacity Approximately One Bushel.
Counter-weight Adjustable for Different Type Grains
Grain-flow Control Slides Adjustable to Prevent Clogging
Atomizing Spinners Ensure Perfect Distribution of Dust
Distributing Outlet Spinners Increase Mixing Efficiency
Opening Adjustable by Quick-acting Slide.
Metering Pan Accurately Measures Grain to Tilt 30 Times per Bushel
Removable Dust Box with Accurate Adjustment—6 injections of dust per bushel. No waste — dust ejected only when grain flows
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APPLE BUTTER

(Continued from page 53)

Franklin D. Roosevelt Weaver, Aunt Nora and some of the neighbor women are peeling and quartering the apples. Tart or sour apples, or what are known as "cooking" apples, are best because a sweet apple will not cook up. The cores are taken out cleanly. Fallen apples are just as good for butter as choice fruit provided all the damaged parts are cut away.

After the required amount of apples are prepared (a bushel of apples will make about two gallons of butter) and the cider and spices are on hand, the cooking begins. This is usually started the next morning, early.

The apples are dumped into the kettle with just enough water to start the cooking. Soon after they start to bubble and steam a small boy is set on a stool within range of the kettle, a long wooden paddle is placed in his hands, and stirring never stops until the butter is finished. A moment's hesitation may result in a scorched taste to the butter.

The quartered apples will cook down considerably. To keep the kettle full, Aunt Nora has a reserve of big pots (enamel ware and copper, this is) of apples on the kitchen stove, cooking to the apple sauce stage. These are added to keep the kettle full.

After the apples are cooked to the appearance and consistency of ordinary apple sauce the boiled down cider is added, and then the sugar. A little less than half as much cider as apples is added. If you have four gallons of apples you add two gallons of cider. The amount of sugar (granulated of course) depends on how sweet you want the butter. For ordinary tastes four cups of sugar is added to every gallon of butter, but if you have a sweet tooth you add more.

At the same time the sugar is added the spices go in. Here personal preference is the guide. Most people like cinnamon, so ground cinnamon is added to taste. Aunt Nora's family likes about a teaspoonful to the gallon. Cloves, nutmeg, and ginger can be added also if you like those things. The best way to find out how much sugar and spices to add is to dip out a spoonful, spread it around on a saucer to cool, and then taste it. Aunt Nora spends a lot of time tasting, for as the butter cooks down it changes in taste when the moisture evaporates. When it suits her taste (or perhaps when Franklin says, "Gee that's good,") it is time to stop adding sugar and spice.

After the desired flavor has been achieved, keep on boiling it. It will by this time have reached the color of good strong coffee without cream. From here on it is a matter of getting it to the preferred thickness. A portion cooled in a saucer will indicate how thick it will be when it is placed on the table. Some like it stiff, so that when it is dropped from the spoon it remains in a little pointed mound; some like it "runny," so that it can be poured. This is how it's preferred for hot biscuits. It makes no difference, it's all apple butter.

After it has reached the point where everybody is satisfied—and this may have taken the better part of a day—the kettle is set off the fire and the canning begins.

Standing on a bench near the kettle is a platoon of boiled out jars made ready to receive the butter. If you are a dyed-in-the-wool apple butter maker you will be satisfied with nothing less than "crock" jars, each holding a quart, half gallon, or even a gallon. These jars are hard to find nowadays, but are thought to be just the thing for apple butter, keeping the light from the contents and having some mysterious virtue of adding a supreme touch of flavor. The hot butter is ladeled into the jars and a tin cap placed over the top and sealing wax poured around the edge. Don't let the butter cool in the kettle for it may taste of copper.

Fortunately you never come out even and there'll be a part of a crock left over. This is intentional, for the kinds would have been reluctant to help at all if they hadn't been sure of this reward. The odd butter goes into a dish and at supper time is flanked by a plate of golden brown biscuits and a slab of fresh yellow butter.

Some years Aunt Nora has made as high as 25 gallons of apple butter, although the average yearly consumption of the Weaver family is about 12 gallons. The extra jars are just in case the apple crop fails the next year. ★ ★ ★ ★

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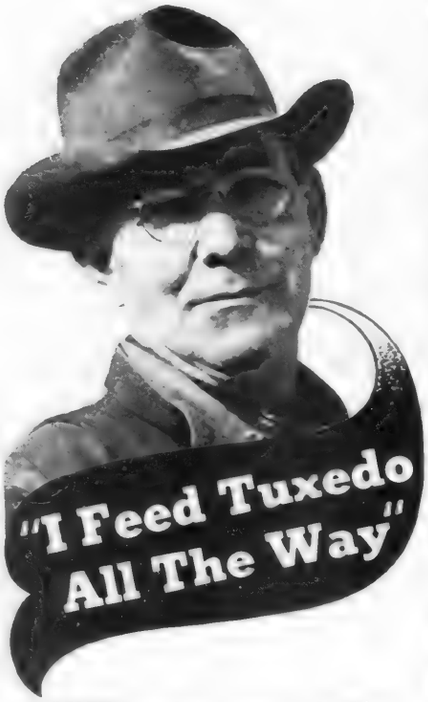

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Authors In This Issue

GRANT CANNON, who wrote, "The Mormon Land" is a grandson of George Q. Cannon, one of the first pioneers to settle in Utah. George Q. had 28 sons, 10 daughters, and more than one wife. Grant Cannon owns a ranch in what he terms, "the most beautiful state," which to him means Utah.

RICHARD C. MILLER, author of "Ventilate And Save," is a professor in the Department of Agricultural Engineering at Ohio State University. His first appearance in FARM QUARTERLY was in Spring 1946 with his article, "The Gamble's Gone From Haying."

PHILLIP J. SAVAGE, JR., whose article, "Deer Park," appears in this issue, has traveled and written extensively. He has his own deer park on his farm near Detroit. When he is not studying wildlife or writing about it, he is busy raising and selling nursery stock.

JOHN LUNN, author of "Chick Sexing," majored in poultry husbandry at Oregon State College where his father was head of the Poultry Department. Later he was poultry extension specialist at Purdue University. He is now poultryman with Allied Mills' Education Service Division.

FRANK H. BEACH is Extension Horticulturist at Ohio State University. "Saving Old Fruit Trees" is the third and last article in a series on the home fruit orchard.

ROBERT R. JOHNSON, author of "Brome Grass," is news editor of *The Beatrice Times,* Beatrice, Nebraska, is the heart of the nation's brome grass section and Mr. Johnson has followed its development since it was first imported from Europe.

SETH THOMPSON says, " I wrote the hamster story because a monkey bit me in 1920." He has been interested in animals ever since. During the war he was a Navy photographer, but before that he was a student of journalism and a reporter for several southern newspapers.

LARSTON D. FARRAR, author of "It's Tax Time Again," was formerly associate editor of *Nation's Business.* He owns an 88 acre Virginia farm and works on it when not busy writing in Washington, D. C.

ROBERT H. RUMLER, who wrote "6-Year Rotation," was introduced to FARM QUARTERLY readers with his article, "Farming On The Curve," in the Summer 1946 issue.

CY La TOUR, whose article, "The Bindlestiff," appears in this issue, studied civil engineering but later found that he enjoyed pictorial journalism more. To get the authentic pictures and story on the migrant workers, La Tour lived the life of a bindlestiff in California bean fields for several days.

J. F. WALKER, author of "The Golden Hoof," is a sheep and livestock man. His story, "Practical Livestock Breeding," appeared in the Spring 1947 issue.

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DEER PARK

(Continued from page 38)

THE FEAR OF MAN, so pronounced in adult deer, is entirely absent in the newborn fawn. Very soon they lose their spotted protective coloring and are taught to shun the man smell and to seek the dark confines of the forest.

kind. They are a most satisfactory little deer." Like the familiar Fallow deer, they are perfectly content to graze if no leaves or twigs are available, and thrive on any pasturage suitable for cattle. Deer can graze quite close, but not having a cleft upper lip, are not as destructive as sheep in this regard.

Lest I be accused of disloyalty to the American deer, I'll try to explain briefly why they are not as satisfactory as certain imported species for a small park. To begin with, they are much more difficult to confine. A big northern Whitetail is one of the jumpingest critters on four legs, and as old woodsman put it, "He can jump as high as he has to." Mule deer and Blacktails are almost as springy, and in addition, have never done well in states east of the Mississippi. The American deer seldom thrives on grass alone. They seem to require some browse, or at least, hay and grain, at all seasons of the year. Except for the southern races of Whitetail, bucks of the American deer are big, burly fellows, quick to assert their rights, and well able to severely maul, or even kill an unarmed man. In a very large wooded park, offering considerable browse, and a mild climate, Whitetails of the small southern races can be very satisfactory. Even so the foreign species offer a distinct advantage in that they alone are free from governmental controls. No game-breeders' license or permit is required, you can kill any or all of your herd whenever and however you choose, and eat, give away or sell the venison subject only to the rules pertaining to ordinary domestic livestock.

The beautiful Chital or Axis deer of India is a lovely species, well suited to southern parks. It can survive northern winters if provided with a windproof shelter, but appears cold and unhappy beside the dense coated Northern species. Its venison, also, cannot compare with that of the Sika and Fallow. I was assured of this by no less an authority on venison than a

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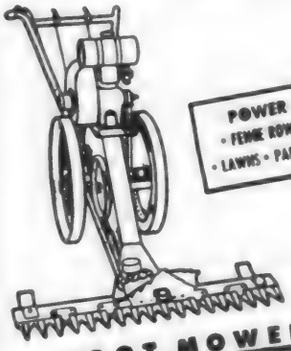

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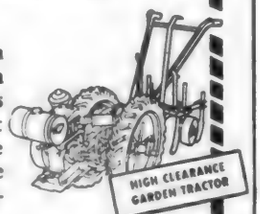

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resident gamekeeper at Woburn Abbey. Before the war this fabulous park, owned by the Duke of Bedford, contained great herds of nearly every known species of deer, not to mention antelope of many kinds, Bison, Zebra, Llamas and others. The large corps of gamekeepers are privileged to shoot their own meat out of these thriving herds, and while walking about the park I came upon one of these worthies skinning a yearling Sika stag in the yard of a neat little cottage. He explained that most of the keepers shot Sika deer because they skinned out so easily and were so well flavored. Injured deer of other species often had to be shot, and he had tried them all. He held nothing but contempt for the Axis and Hog deer, claiming they were difficult to skin and comparatively poor in quality of flesh.

The various races of Wapiti and Red deer are too large, and their stags too dangerous for the small park, while the Sambar and other Rusine deer fail in both hardiness and flavor of venison. Disregarding the Central and South American species as tropical exotics, we are left with only the Sika and that venerable denizon of a thousand parks, the Fallow deer. These last two are very much alike in habits, and any remarks about the requirements of the Sika, apply equally to the Fallow species. Fallow deer may be had in three distinct color phases. The normal summer coat is rich tan, spotted with white, with a black-bordered white area around the tail, while in winter this spotted color gives way to a uniform grey-brown. The all white or albino variety breeds true to color, as also does a melanistic type which is dark chocolate brown throughout the year. I have never seen an albino Sika, though they doubtless exist, but have seen and owned many specimens of blackish brown coloration, without spots, and identical in hue to the melanistic phase of the Fallow. The Sika's natural summer coat is bright chestnut red, dappled in white, with a black stripe down the center of the back, and around the snow white tail area. In September when the smokey brown winter coat is assumed, the stags polish their graceful four tinted antlers ivory white, and their swelling necks are covered by a handsome dark-brown mane. From then until Christmas they stage desperate fights for leadership of the herd, and challenge each other with their version of the Wapiti's famous "bugle," a high, whistling whine sliding down the scale into a throaty bawl.

The choice between the Sika and Fallow species is largely one of personal taste. As citizens of a park they are nearly equal in good qualities. Fallow deer are larger than the Japanese race of Sika, but the stags are almost never dangerous to humans. Sika deer are more graceful in their movements, have shorter, neater heads, and are, to my mind, more handsome. Fallow stags lack a mane and have a rather unattractive "adam's apple" on the throat. The voices and cries of the two species are very different, and I have never known them to interbreed, although confined together in numerous parks. No doubt they would if a pair were raised together from birth. The antlers of the mature Fallow stag are very broad and flattened, and differ widely in shape and number of points. Sika stags, on the other hand, after their year as a "spike buck," grow a symmetrical rack of four points to a side. Their antlers increase yearly in size, up to the fifth or sixth year, but barring freaks, never change the four point pattern. They are beautifully formed, and really good ones range from twenty to thirty inches on the outside curve. The record head is slightly over thirty-one inches. A skull and antlers of near-record proportions hang unnoticed in the Buckhorn Saloon, San Antonio, Texas. Fallow antlers average considerably larger than Sika, but I personally prefer the simplicity and grace of the latter. No animal, even a fine Arabian horse, looks "better bred" than a prime Sika stag.

In the actual construction of a park, the boundary fence is the only item really necessary. Buildings, unless they contain the only hay racks, will almost never be used. I have an open fronted shed that hasn't earned a dollar of its cost, and plan to tear it down for lumber. Deer use a shed more on warm winter days than cold ones, to avoid bedding down in wet snow. If the site selected for a park is unusually open and windswept, or if its area is less than the minimum five acres, a south-facing shed will be used, and should be provided. A shelter belt of Arbor Vitae or other dense coniferous trees will do nearly as well, if located just outside the western boundary. Bundles of tall cornstalks leaned against the fence from outside can form an inexpensive winter windbreak.

In all but the mildest climates, some sort of feeder for hay is essential. This may be of the simple type used for sheep, vee in cross section, or as complicated as ingenuity allows. The main consideration is the frequency with which it must be filled. A small hay rack versus a large herd of deer equals either an unnecessary amount of labor on windy winter days, or a hungry herd in poor condition at fawning time .A small hayloft made in the shape of an enormous hopper with a slatted vee bottom is ideal, and may require filling only once or twice a winter. Chopping or even grinding alfalfa hay to save space is practical, but I have had no experience with feeding hay in this form. Deer in traveling menageries have been successfully fed on pellets, consisting of a mixture of ground hay and grain, moistened with molasses, and compressed. This would be a neat method, but I think it would hardly justify the extra expense involved, particularly since the exercise of mastication and cud chewing is beneficial in cold winter weather. Ample feeder space should be allowed for each animal

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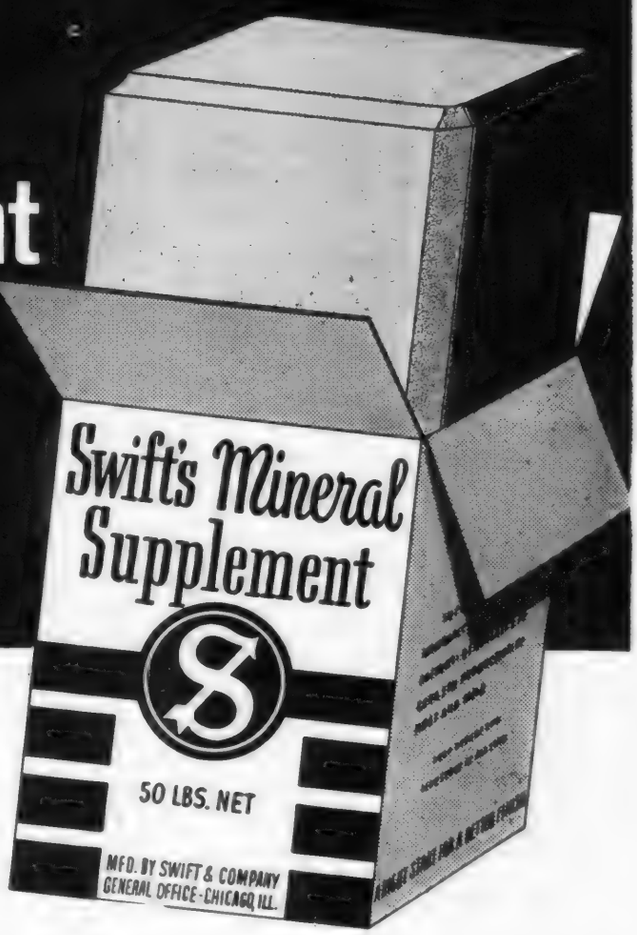

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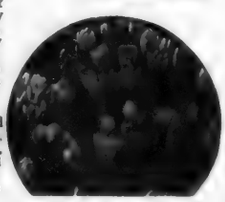

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to prevent crotchety old does from starving the weaker members of the herd by continually driving them away from the forage.

After experimenting with various rations for northern parks, we have found that Sika deer winter best on alfalfa hay and shelled yellow corn. I know several other breeders who have arrived at the same formula for Sika and Fallow deer, as well as Whitetails and Axis. The amount of hay and corn required varies with size, species and climate. Four hundred pounds of good legume hay, and fifty pounds of shelled corn per hundred pounds of body weight is our average here in Michigan. The best quality legume hay is the most efficient, as deer are wasteful feeders on coarse, stemmy roughage. Self fed alfalfa, a teacupful of shelled corn per head per day, water or snow (not ice), and the omnipresent block of salt, is all the winter care deer require.

In laying out fence lines, always take advantage of the lay of the land to put the fence as high as possible with relation to the land on each side. An advantageous situation often occurs where a piece of waste land or a woodlot is surrounded by cultivated fields. In the old days of the walking plow, farmers almost always turned the furrows toward the edge of the field, year after year. In time, this piled up quite a sizable ridge around the boundaries. This was, of course, poor farming practice, since it buried a lot of good topsoil at the edges, and exposed the subsoil down the middle. For once, we can turn the mistakes of our forefathers to good advantage by building a deer fence on top of these ridges, thereby not only adding a couple of feet to the height of the fence, but putting any animal that intends to jump it at a disadvantage through having to run uphill and leap from uneven ground. This makes a lot of difference. Avoid long, narrow corners, and *cul de sacs* where deer may be trapped by dogs. Even if dogs never bother the herd, the deer will be apprehensive in such places, and will annoy you by hysterical dashes out of them, or leaps against the fence. The height and strength of the fence required depends on the species you intend to confine. In any case, keeping dogs and coyotes out is as important as keeping deer in. Few dogs can scale a seven foot fence, so seven feet may be regarded as a minimum to exclude these invaders.

To confine Japanese Sika and Fallow deer a fence must be between seven and eight feet high, depending on whether the approach to it is slightly uphill or slightly down. Our fence is seven feet, four inches high, and in eight years not one deer has ever fairly jumped it. A six-months-old fawn once climbed to the top of a pile of cedar rails, and from there leaped and scrambled over the top, but with the rails removed there has been no further trouble. This fawn, by the way, ran hysterically around the park fence, making re-

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peated efforts to jump back in, and was recaptured by merely opening a gate. Dogs have managed to get into our park on several occasions by enlarging washouts and crawling under the barbed wire. When closely pursued, deer often leap against the fence several times, and are hurled back to the ground. They always seem to regain their wits at the critical moment, however, and we have had no losses, or even injuries from this cause. A friend who raises Fallow deer reports that they occasionally jump his seven and one-half foot fence, if badly frightened by dogs, so perhaps Fallows are slightly higher jumpers than Sika. Axis deer are about equal to Fallows, but Northern Whitetails can soar beautifully over a seven and a half foot barrier, given any incentive at all.

After first laying out the fence to take all possible advantage of ridges, etc., the next step is to cut down "threatening" trees. By this I mean trees that appear capable of damaging or flattening the fence by falling, or dropping large limbs on it during windstorms. It pays to be ruthlessly thorough in this regard, since it is often too late, after the park is completed, to remove over-leaning trees and large limbs. Remember that a large tree falling across the fence not only creates an escape avenue, but actually baits it with tempting leaves and twigs, thereby insuring a quick exit of the entire herd. Such a mass escape is the only real worry in raising deer and its prevention requires just a little imagination and foresight.

With the park enclosed, the next step is to obtain breeding stock in the species of deer preferred. Two healthy young does and a vigorous stag form the ideal foundation unit. All three may be purchased as weanling fawns in their first winter, or as breeding adults; it makes little difference. The larger zoological gardens nearly always have a surplus in such easily kept animals as Sika and Fallow deer, and stock obtained from this source offers many advantages. They will be used to confinement, crowds, strange noises and smells, and therefore easy to manage. In ninety-nine cases out of a hundred they will be entirely free from internal parasites and diseases, and last but not least, will be comparatively easily caught and crated without injury.

Given the opportunity, every doe will produce her first fawn in the spring of her second year, and will continue to breed until she is ten to fourteen years old. Stags will breed as spikers in their second autumn, but are not really reliable until the third. The fawns are normally dropped in early June, and remain in hiding, if cover permits, for two to six weeks. They are exquisite little creatures, and I get the same thrill every time I find one, newly born but amazingly competent, curled up under the Mayapple leaves. It's easy to see why the Disney Studios used Japanese Sika fawns as models for "Bambi's" youth-

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ful stages. I have seen these fawns, less than two hours old, swim a broad, boulder-strewn creek in a raging spring flood, with water up to a man's waist and a ten mile current. My Labrador Retriever won't try it, but the fawns don't even hesitate.

It is difficult to estimate the number of deer a given park can support, as the fertility, moisture, and so-called carrying capacity of soils differ in various sections. It also depends on the amount and duration of supplemental feeding. Since deer, unlike cattle and sheep, are in their pasture throughout the year, they keep the grass well clipped from earliest spring until snow flies. This is hard on any sod and makes overstocking doubly dangerous, since the palatable, nutritious grasses will then tend to give way to saw grass, crab grass, moss and other uneatable vegetation, which may, by an appearance of greenness, conceal the lack of edible forage. Under these conditions deer may become extremely thin and unthrifty. Their thick coats of springy hair concealing from the inexperienced owner what might otherwise be a very gaunt appearance. As in all livestock, a lustrous, glossy, alive looking coat, is the best outward indication of health and well being. Whenever deer will eat good quality legume hay, they should have it. In a properly stocked park Sika and Fallow deer will not touch hay as long as they can obtain their minimum requirements of green stuff. This should be, in the North, from early spring until the hard freezes of late fall.

Mature Sika and Fallow does regularly produce one fawn annually. Twins and triplets are nearly as rare as in humans, and even though twinning strains might be developed, as in Shropshire sheep, they would not be particularly desirable. One big, strong, well finished fawn is worth two small, lean ones, and with the livability practically one hundred per cent, a herd increases at a remarkable rate. For instance, figuring half the fawns males and half females, a mature trio will increase to twenty animals in five years, twenty-seven in six, and thirty-seven in seven years. If the herd ran heavily to female fawns at first (we had only one male fawn in the first five years), the increase would be much faster. All this goes to prove that there will be a yearly surplus which must be taken care of, to avoid overstocking the park. To count on selling this surplus as breeding stock to prospective beginners is a snare and a delusion. The catch is in catching the deer. I have experimented with a frightening variety of Rube Goldburg-like nets, trap corrals and worse, and given them all up as useless. I have managed to catch two deer with lariats, and now you can't approach our otherwise tame herd with anything larger than a piece of binder twine without making them suspicious for the rest of the day. They have an amazing sixth sense that warns them when something is up,

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and they can outguess and outwit you with maddening success. Sedatives given by mouth, in grain, etc., are unreliable and dangerous to use on ruminants. A large shed, in which the deer are fed during winter, will work as a trap if provided with quick closing doors. Even this is unsatisfactory, since such a shed is an expense and an eyesore, unnecessary except as a trap, and catching one or two out of a desperately leaping herd of trapped deer often injures or even kills more than you secure. The answer to the whole problem is to be cold blooded and business-like enough to shoot, and eat, or sell the yearly surplus as venison. In other words the herd must be sensibly managed the same as a small flock of sheep, only sufficient young stock being retained to replace old breeders on a planned rotation.

The sex of fawns under a year old is difficult to determine except by close inspection, so as to avoid holding over excess males in the belief they are females, a system of marking should be used in all herds of fair size. Fawns may be easily captured during the hiding period in early summer by tossing a wood rimmed hoop net over them as they lie in the grass, after which they may be examined, and a small notch or punch made in either the right or left ear, according to sex. After the winter coat is assumed, in October, the fawns desired for breeders may be marked with a spot of bright colored paint. The paint used should contain no lead and may be applied while the herd is eating scattered corn, by means of a piece of paint-soaked corncob propelled by a slingshot. If the fawns are quite tame, as they should be, a child's water pistol filled with permanent red or black ink makes a good marking tool. In a small herd marking will be unnecessary, since the fawns will be known and recognized individually. Castration of male fawns, such as practiced with domestic livestock, is absolutely unnecessary. Unlike lambs, pigs, etc., there is almost no development of the testes under the age of one year.

The fawns not required as breeders should be killed and dressed before winter feeding begins, at from five to six months old. At this age they are fat and meltingly tender, without the least trace of a "strong" or gamy flavor. Those who have eaten only the wild venison of adult buck deer, shot during the hunting season, have no idea how a prime domestic fawn can taste. No one would think of using an old range bull, or an aged and battle weary ram for anything but bologna and sandwich spread, yet when Joe Nimrod goes deer hunting, he's after the biggest, fightin'est old stag he can get. As he describes the massive antlers he wonders why the guests are only picking at their portions of shoe leather. The Buck Law has become so deeply ingrained in the average law-abiding American, that the idea of killing a doe or (horrors), a fawn, seems very close to a felony. Recently I dressed a

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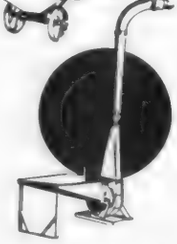

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Sika fawn, five months old. In his entire life this fawn had eaten only his mother's milk, bluegrass, buckeyes and acorns, plus perhaps a quart of shelled corn, yet he was fat as butter. Cuts so closely resembled those of a grade "A," corn fattened Southdown lamb, in appearance and flavor, as to be indistinguishable by anyone but a professional taster.

If correctly done, slaughtering requires a minimum of sang-froid, and there is satisfaction in knowing the job is being done humanely and efficiently. With a frozen food locker available, it is possible to convert the entire year's surplus into meat at the best possible time. Lacking this convenience, it is necessary to wait for freezing weather and to utilize the year's crop one at a time to prevent spoilage. Beginning in September or October, the herd should be given a few handfuls of shelled corn every day or so, at a specific point near the park fence. If the corn is scattered in the grass, the deer will spend considerable time nosing around after it, affording an excellent opportunity to select and mark the old breeders to be culled and young stock to replace them. The feeder should stand outside the fence, since the deer will then be less nervous, and easier to observe. The corn ration may be slowly increased during early November, putting a little extra finish on the herd in addition to its primary purpose of keeping them tame and attentive to your call.

To a person unused to butchering farm animals, the idea of turning a live deer into attractive cuts of meat and a useful hide might seem a rather large order. It is in fact very simple, and hardly more complicated than preparing a cottontail rabbit for frying. The tools and materials required, in the order of use, are: (1) an accurate .22 caliber rifle and .22 long rifle cartridges; (2) a sharp, handy knife; (3) a gambrel stick with a length of rope and a couple of pulleys; (4) a hacksaw or small meatsaw; (5) a clean dish for the liver, heart, etc.; (6) a large pail for the entrails, head and feet, and (7) a box of table salt for the skin.

Throw out some corn at the usual spot, and when the animal to be slaughtered is clear of the others at close range, shoot it in the head, anywhere back of the eyes and above the line of the mouth. Thus shot, it will drop like a stone. Go over to it at once, and on the very rare chance that it still shows signs of life, shoot it again where the back of the neck joins the head. A second shot is very seldom necessary. The thin crack of a .22 rifle does not unduly frighten the rest of the

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herd, and they will return and continue feeding as soon as the dead deer is removed. The method of sticking is largely a matter of choice. There is no necessity of racing up and slashing the throat before the heart stops. This belongs in the same category with such superstitions as cutting off the testicles and digging out the harmless little glands on the hind canon bone, "or they'll taint the meat." The blood does not remain in the edible meat anyway, but drains into the large veins of the body cavities, entrails and neck, as they become relaxed. The idea is to get rid of this blood before it starts to clot, and the best method of doing this is to sever the large veins of the neck with the skinning knife.

The quality of all meat is improved by hanging for a week or more, and venison is no exception. It tends to dry out quicker in roasting than does lamb but extra attention to basting, and the judicious use of a few strips of bacon, easily remedies this. A roast leg of fawn, cooked slowly and basted often, is a dish fit for a king.

Deer in the wild state have numerous diseases and parasites, and countless natural enemies. Winter starvation alone takes a terrible toll, leaving survivors weak and easily preyed upon. In a properly managed deer park, this situation is reversed. A well fed herd has tremendous resistance to disease, and parasites are almost unheard of. Domestic animals, particularly sheep, should never be graz d with deer. I know of one park where bad luck is the rule rather than the exception. This herd has not only failed to increase, but is fast dwindling away. Twenty-five adult sheep share the park with the deer, and a hundred thousand stomach worms share the sheep and the deer. In no other park that I know of where deer are confined alone has there been a single record of either disease or internal parasites.

When their teeth are worn out, the deer simply die of old age. We once lost two fawns from overeating of oats, and caused one miscarriage by overfeeding corn, but this was in the first years, and won't happen again. At least once every year I make a thorough search for parasites through the stomach, liver, lungs, and intestines of a slaughtered deer, and have yet to find the first one. If by any chance parasites should be discovered, the best and only course to be followed is to keep the animals in as fine condition as possible with an ample, high vitamin diet, and add a pound of Phenothiazine to every ten pounds of their salt. Unthrifty looking animals should be killed, and the parasites positively identified by sending some in a bottle to the state Department of Agriculture. A well nourished animal of any species is seldom bothered by internal parasites.

To my way of thinking the dangers of inbreeding in wild animals are vastly overrated. Where domestic livestock have been closely bred for centuries to establish cer-

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tain useful, but unnatural characteristics, it is logical to assume that numerous hereditary defects have been developed, needing only the doubling up of genetic factors through inbreeding to deteriorate into a succession of freaks. This is not hard to understand when from Mother Nature's standpoint a black and white cow with an enormous udder, or a white, long tailed sheep with a twenty pound fleece, are freaks to start with. A normal deer, of nature's selection in type and color, does not have any hereditary defects lurking in its background because those prankish experiments were eaten by wolves through the ages, and only the fittest type have multiplied. That is the main reason I dislike albino and melanistic Fallow deer. Starting with vigorous foundation stock, of the natural type, and unrelated if possible, deer may be "line bred" for an indefinite period without the addition of outside blood. Certain characteristics which appear desirable from the standpoint of beauty or utility may be accentuated by selection, but the primary objective should be to maintain and increase the vigor and uniformity of the stock, and cull the ones that depart from the wild standard. If and when it is desired to add new blood, this is best accomplished by the purchase of a healthy male fawn in the late fall or winter. Our last crop of fawns would be termed frightfully inbred by a livestock purist, yet we have never had a finer looking, more vigorous and uniform bunch.

A careful inspection of the boundary fence every couple of weeks, with quick repair to weak points, washouts, etc., practically eliminates both the dog and escape problems. Even if a big, fast dog such as a greyhound or shepherd should get into the park, a catastrophe is by no means imminent. Deer are not newcomers at the game of "you chase me," and the chances are the herd will run him ragged. When closely pressed the deer will scatter, and as they criss-cross and interweave the dog will find himself chasing a fresh animal every minute or so, while the other deer regain their wind. The biggest danger with dogs is their ability to frighten deer into jet-propelled take offs over the fence. Deer cannot only run many times as fast as sheep, but are far cooler headed and more tenacious of life. If deer are killed or injured by dogs, a claim should be filed immediately with the state or county. The dog tax was originally instituted to repay farmers, stockmen and property owners for damage done by dogs, and very little of it is usually paid into these channels.

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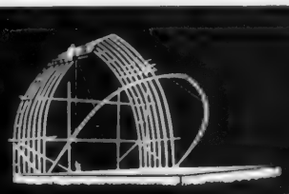

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the tree roots. It would have taken five men a month to clean it up. In the next few years we fenced around this patch of jungle and turned in three deer, a young stag and two adult does of the Japanese Sika species. We hardly saw the deer that summer, and scarcely had to feed them that winter, but a change in the park began at once. During the next three years the nettles went first, the vines and brush next, and as the fallen trees were made available, they were sawed up and removed. With the trunks gone the reared-up root discs fell back in place and the now dead brush was gradually thrown into heaps and burned. Bluegrass and white clover, helped by seeding, took over the exposed land, and we found ourselves with eleven fat and healthy deer in a park that invited a stroll on its well clipped turf. Nearly every year since then we have dressed and eaten five or more fawns, and we winter a herd of only ten deer—one adult stag, six adult does, a yearling doe and two fawns. Every five or six years a vigorous male fawn is raised to replace the old stag, and this rotation has proven the best for our particular park.

Our deer have always been on familiar terms with our own does, and the does will even make lightning-like guerrilla attacks on them during the fawning season. The stabbing of a doe's sharp front hooves, coupled with the whirlwind nature of her assault, will hurt and bewilder all but the boldest of canines.

Deer are the perfect "Lazy Man's Livestock." They require no currying, docking, shearing, or obstetrics. Their beauty is a by-word and they attract and interest nearly everyone. I know a man with a small park in central Indiana who writes that after a hard day's work, he can go down into his deer park and "rest faster than any place else on earth." I think he hits the nail right on the head. ★ ★ ★

THE BRAHMANS

Sir:

The Pan American Zebu Association wishes to extend its congratulations to your publication and to Mrs. Faye Bennett for the article about Brahman Cattle appearing in the latest issue of the FARM QUARTERLY.

Without doubt, Mrs. Bennett's article is the most unprejudiced factual writing yet published in a national periodical concerning Brahman or Zebu Cattle.

If this organization can ever be of service to your readers, we will be glad to hear from any of them.

Roy G. Martin, Secretary
Pan American Zebu Association
Cotulla, Texas

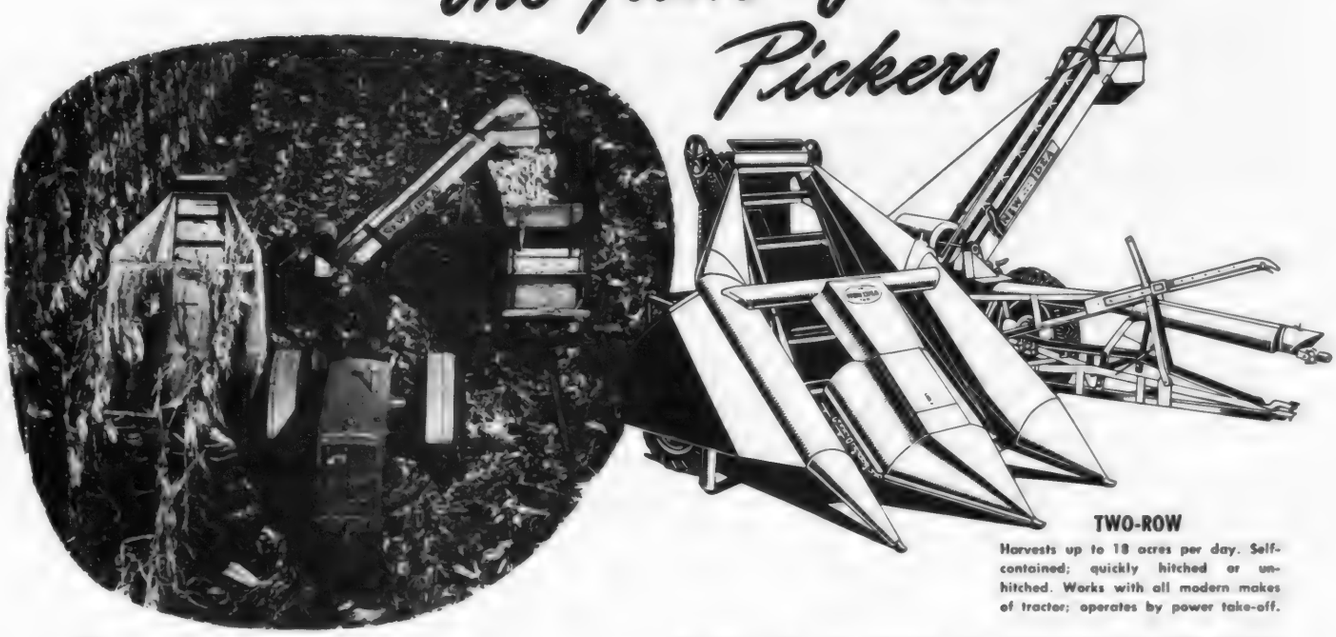
SIN OF OMISSION!

Our sincere apologies to Mr. Charles Philip Fox for the omission of his by-line on the "Electric Fence" article which appeared in the Summer, 1947, issue of Farm Quarterly. We received numerous favorable comments on this article from readers, including electric fence manufacturers. Thanks, Mr. Fox, for a fine job.

NEW IDEA

universal pull type corn picker

the Pick of the Pickers



TWO-ROW

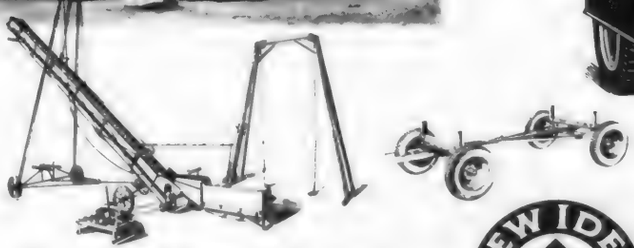
Harvests up to 18 acres per day. Self-contained; quickly hitched or unhitched. Works with all modern makes of tractor; operates by power take-off.

Mechanical corn picking was introduced by NEW IDEA twenty years ago. Although corn harvesting has since undergone numerous improvements, NEW IDEA continues to command the respect of corn growers as the recognized leader in this type of equipment.

Today, mechanized harvests have become a practical necessity. Farmers know that NEW IDEA Corn Pickers assure them the utmost in performance, speed and economy that implement engineering has so far achieved. A detailed examination will show you why these famous machines snap and husk so cleanly; deliver corn on the wagon so efficiently. See your dealer, or write for descriptive folders.

ONE-ROW

Capacity 8-12 acres per day. Offers same features as larger model: correct balance; ease of control; clean picking; remarkable corn saving ability.



NEW IDEA Portable Elevators and Rubber Tired Wagons are built to the same high standards of design, materials and workmanship which have well earned the stamp of farm approval so long enjoyed by NEW IDEA. They are excellent working partners for NEW IDEA Corn Pickers.

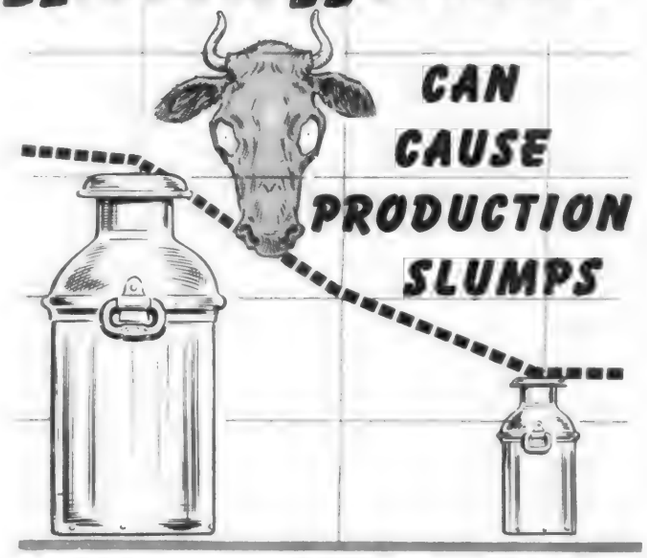
NEW IDEA FARM EQUIPMENT

NEW IDEA

FARM EQUIPMENT COMPANY

Factories: COLDWATER, OHIO, SANDWICH, ILLINOIS

"HIDDEN HUNGER"



CAN CAUSE PRODUCTION SLUMPS

OCT. NOV. DEC.

Fall and Winter dairies *can* pay best. But, production slumps may reduce profits at this peak price season if your barn is invaded by:

***"HIDDEN HUNGER"*—Lack of essential mineral elements needed by livestock for sturdy health, rapid growth, peak production and reproduction.**

Insure your stock profits against "Hidden Hunger" Spring, Summer, Fall, Winter—year round—by supplementing their daily ration with MinRaltone. It contains 11 essential mineral elements, *plus* Vitamin D. *Write for free literature and the MinRaltone Plan of supplementary feeding for young and dry stock, milch cows, beef cattle, hogs and poultry.*

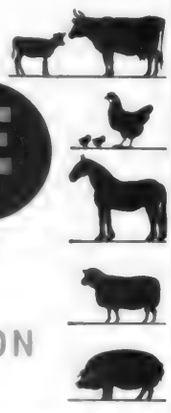
NEAR'S FOOD COMPANY, INC. Established 1899 **BINGHAMTON, N. Y.**

3 WAYS TO FEED MINRALTONE *year round*

NEAR'S

MINRALTONE

WITH VITAMIN D



MINERAL FEED SUPPLEMENT

for HEALTH PRODUCTION PROFITS

Copr. 1947 Near's Food Co., Inc.

COLD SATURDAY FARM

ABERDEEN ANGUS CATTLE

Purebred bulls of breeding age and younger, and of excellent conformation and bloodlines, for sale.

Herd T. B. and Bangs Accredited **FINKSBURG, MD.**

THE MORMON LAND

(Continued from page 23)

were touched by the icy finger and shriveled to the ground. Many of the people felt that this was the final defeat and there was talk of moving on to California. But the stronger among them said, "God has sent us here, and here we are going to stay, come weal come woe." By the middle of July the group was somewhat heartened by the new wheat but there was not enough and once again they faced a winter of famine. Of this period Parley P. Pratt, one of the leading figures in the church and a member of the twelve apostles, wrote in his journal: "During this spring and summer my family and myself in common with many of the camp, suffered much for want of food . . . We had lost nearly all our cows, and the few which were spared to us were dry. I had plowed and subdued land to the amount of nearly forty acres. In this labor every woman and child in my family, so far as they were of sufficient age and strength, had joined to help me, and had toiled incessantly in the field, suffering every hardship which human nature could well endure. Myself and some of them were compelled to go with bare feet for several months, reserving our Indian moccasins for extra occasions. We toiled hard and lived on a few greens and on the thistle and other roots."

Though they were hungry and in rags and worked their lands barefooted the leaders of the Church did not lose prestige or authority with their people. Members were called for the hazardous task of colonizing the desert. In this field the organizing genius of Brigham Young is most clearly seen. Scouting parties were sent out and brought back reports on every available location, which meant fertile land and available water. Leaders were appointed and a band of settlers chosen. Everything they possessed was loaded into wagons and the band would set out to found a new village.

THIS IS the Mormon Cricket

These groups who faced the hardship of winter travel and the rigorous life of the new communities which were being established were not composed entirely of men. The married men of the band brought with them their families. Many of them, of course, were polygamous, and when the location for the new settlement was reached, had the responsibility of establishing homes for each of their wives. It was usually the women who brought along bulbs, slips and cuttings for the new garden and pits from the peach, cherry and plum for the orchard. One of those early women, Patty Sessions,

Thousands of Farmers say the RED HED
Gives More Corn Sheller per Dollar!

There's a New and Faster Way to Shell Corn

Saves Time, Work and Money . . . Shells Cleaner and Faster

It had to come! A precision-built corn sheller . . . new in design, construction and performance . . . a corn sheller that sets new high limits of capacity and money-earning ability. The new Harvey Red Hed Corn Sheller with its exclusive, patented, open, triple-action KERNOLIZER shells 150 to 200 bushels per hour; machine picked, husked, snapped, even "soft" corn—all look alike to the Red Hed.

The secret of greater capacity is in the revolutionary KERNOLIZER which does these 3 things *at the same time:* (1) it not only shells corn outside the unit—like ordinary shellers—but at the same time (2) it shells corn on the inside . . . and (3) to prevent "choking," even in fast feeding, the KERNOLIZER auger action pushes cobs and husks out of the way. Result: the fastest, smoothest, cleanest corn shelling job you ever saw.

REMEMBER
ONLY THE NEW RED HED SHELLER HAS THE FAMOUS WORK-3-WAYS-AT-ONCE
KERNOLIZER

No wonder corn-raising farmers everywhere are enthusiastic over the Harvey Red Hed—they know from seeing it work on their own farms. A screen pre-cleaner—controlled air blast—4-way feed hopper—adjustable cob outlet—new type corn thrower—corn discharge auger floating on sealed, dust-proof ball bearings—are among many other features of this great Harvey Red Hed Corn Sheller.

FREE . . . "Secrets of Successful Feeding"—a great new book on feeding—to help you make feeding of farm grown grains produce more meat, milk and eggs at less cost. Practical information-packed pages—rations, feeding hints—dozens of new, proved profit-producing combinations of feeds and minerals. Tells why, where and how to feed for best results. Mail the coupon below and we'll send you a copy with our compliments.

SEE THE HARVEY RED HED
AT YOUR LOCAL DEALER

If good, clean shelling with less labor at lower cost and in less time are what you need—then you need a Harvey Red Hed now. Thousands of good agricultural implement dealers know the Red Hed. Drop in and see your local Harvey Dealer today.

For Full Facts About This Great New Corn Sheller MAIL THIS COUPON NOW!

Harvey RACINE

THIS BRINGS THIS STARTLING BOOK

HARVEY MANUFACTURING CO., DEPT. N-10
RACINE, WISCONSIN

I want your new book "Secrets of Successful Feeding." Please send my FREE COPY.

Tell me how the new Harvey Red Hed Corn Sheller will help me shell corn faster, better and at lower cost.

Name .....

Address .....

Town ..... State .....

My Dealer's Name is .....

HARVEY MANUFACTURING CO., RACINE, WISCONSIN

Luxurious Eating...

...All Year 'Round When You Supply Your Table From a "Quicfrez" Farm Locker Plant

Every meal a better meal, all year long, when there's a QUICFREZ in your home. Fruits and vegetables from your own garden, with all their original freshness and flavor — meats, poultry and game — all kinds of health-giving foods can be frozen and stored in this generous sized, quality-built QUICFREZ.

SEE YOUR DEALER — let him show you how QUICFREZ is built for lifetime service and satisfaction.

What to Look For — In Quality Freezer Value

- CAPACITY — 12½ cu. ft. Stores up to 600 lbs. of meat.
- DURABILITY — QUICFREZ is built to last — all-steel, welded construction. Surrounded by 5" of Glasswool insulation.
- PERFORMANCE — QUICFREZ is engineered for trouble-free service — thousands in daily use for over 8 years.
- CONVENIENCE — QUICFREZ 4-Compartment Storage design makes food storage and removal 75% easier.

SANITARY REFRIGERATOR COMPANY

DEPT. No. FQ-1, FOND DU LAC, WISCONSIN

Builders of "Sanitary" Refrigerators for Over 40 Years—Farm Locker Plants Since 1939

The BEAUTIFUL New Sanitary Ice Refrigerator for 1947... At Good Dealers Everywhere

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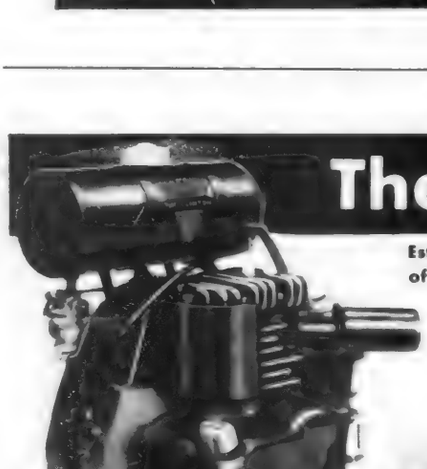
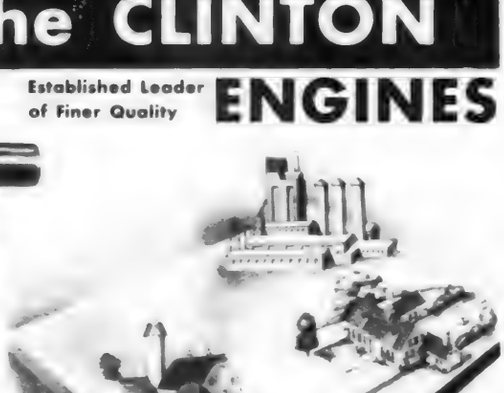
The CLINTON ENGINES

Established Leader of Finer Quality





1 to 2 H.P. 4-cycle Air-cooled

Clinton engineers have been consistent sticklers for quality. . . . In building the world's most outstanding engine, costs were secondary. . . . Quality was the prime factor in selection of all parts. The Scintilla Airplane type magneto is hermetically sealed; no moisture can enter—sure fire high voltage starting, with even performance at all speeds.

Clinton provides a large diameter steel forged crankshaft, longer length bearing surfaces and bearings ample for a 3 H.P. Engine. . . Expensive, yes, but the best for quality and longer life.

Other features that have put the Clinton on top are the Patented Finned Manifold—no vapor lock—and greater economy of operation. Flyball type mechanical governor, enclosed, running in oil. . . . It positively governs at all operating speeds.

See your local Clinton dealer for authorized Sales and Service

THE WORLD'S LARGEST MANUFACTURER SPECIALIZING IN 1 TO 2 H. P. ENGINES

CLINTON MACHINE CO. CLINTON, MICHIGAN

through experimentation and selection, developed the Blue Sessions' plum, which for decades has been Utah's leading market plum.

With the great drive to expand and the new lands to conquer, polygamy was economically possible here in Utah. Each wife usually had her own garden and busied herself in the home industries. With the help of her children she was almost self sufficient. Many students of the Mormons feel that even if the church had not acquiesced to the wishes of the Federal Government and given up the practice of polygamy in 1890 the institution would have died when all of the available land was taken. Though at its peak only three per cent of the men practiced polygamy, the polygamists were usually the leaders of the community and their actions were considered by the rest of the country to be typical of the group as a whole. The attack on polygamy usually pictured the Mormon women as being in a degraded social position. The Mormons, however, claimed that polygamy made possible a woman's world. No woman who wanted to get married need go without a husband.

Dry Farming

At Bear River City a new colony was established which was to be the first group to practice a new agricultural method that would add hundreds of thousands of acres to the tillable lands of America. A group of Scandinavian emigrants had been sent by the Church to establish this new community. Like all of the other groups they plowed the land and watered their crops from the nearby stream, the slightly brackish Malad Creek. They found, however, that their poor crops were followed by even worse crops. As they soaked their lands with the alkali water from the creek even more alkali dissolved from the depths of the soil and rose to the water's surface to be left as a thin white icing on the surface of the land; naturally the crops failed. In 1863, faced with complete ruin, they did a desperate thing. Abandoning their alkali whitened fields they plowed up the sage brush land above their irrigation system and planted their crops there. To their surprise they reaped the best harvest the community had known. They were the first dry-farmers in America. News of their success spread rapidly, but belief in the possibility of raising crops on this dry land without irrigation was slow to follow. Even as late as the 1880's the doubt was so great that when David Broadhead testified in court that wheat could be raised without irrigation he was indicted for perjury. Broadhead, a successful dry-farmer from Nephi, Utah, returned to his farm and hung up a big sign renaming it "PERJURY FARM." It took many years of experimentation and investigation before enough was known about dry-farming to develop methods that would insure its success. Though Utah has the distinction of being the first State in which dry-

farming was practiced, this agricultural art was discovered independently in several other localities and the general information regarding this unusual method is drawn from the experience of all dry-farming areas.

Essentially the problem of the dry-farmer is to store up in the soil the limited amount of water that nature provides; to hold it there for the use of his crop; and to cultivate his crops in such a way that they will make the most economical use of the water that he has stored. In other words, he turns the soil of his farm into a reservoir for storing water, covers it over so that it will not evaporate, and then he uses it carefully so that none is wasted in the production of a crop. To be able to do this there are at least two fundamental requirements that nature must provide. There must be at least ten inches of rainfall each year and the soil must have a uniform consistency for a depth of eight to ten feet. A greater depth adds more storage space.

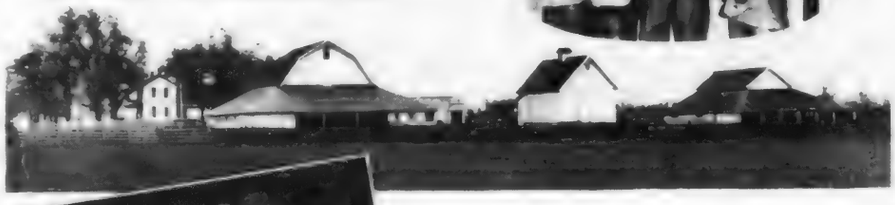
Holding the Moisture

In order to trap the rain and the melting snow, which under natural conditions would be almost totally lost by runoff, the land must be plowed deeply. It was soon found that the direction of the furrow, too, was an important factor in preventing runoff. Where the furrow was plowed with the slope of the hill it simply formed a ditch by which a large part of the water escaped. When plowed across the slope the furrow dammed the runoff, and in winter held the snow and prevented it from blowing away. Even before its value in erosion control was discovered the dry-farmer made contour plowing his rule. As the water sinks into the ground each soil particle is coated with a film of water by capillary action. This is the moisture upon which the farmer must depend for his crop. In humid countries this downward flow eventually ends when the water table is reached and there is a subterranean runoff. In the deep dry soils of Utah the rain seldom, if ever, reaches the water table; instead it is held suspended in the soil to a depth of ten to fifteen feet. The amount of water that is held in this way will run from 15 to 20 per cent of the weight of the soil. It is like holding water in a sieve, all you can hold is what will cling to the mesh. But when you have a succession of sieves to a depth of ten feet or more a lot of water will be held.

The rainfall of this country, however, is not sufficient to raise a crop each year, so the general practice has been to plant every other year and to use the soil to store water for the crop on alternate years. The farmer divides his land and plants half of his acreage and allows the other half to summer fallow. Here the second great problem of this type of agriculture must be faced; how to keep the carefully stored water of the first year from evaporating during the hot dry summer. In

Tenant-Operated Farm Earns High Income

The Parkfield Farm of Toluca, Illinois. Operated by Ralph Farwell and family (right); owned by Rev. F. Alvin Park of Bartonville, Illinois.



COMPREST, developed by Mr. and Mrs. Farwell, won the 1946 Illinois Grand Championship and was judged All-American Hampshire Boar of the year. Sold for $8,000.

Raise Championship Livestock on 50-50 Partnership Basis

"Profit-sharing incentive certainly works on this 260-acre farm," says Rev. Park, former president of American Pork Producers Associated. "That's why my tenant and I operate on a 50-50 basis. The farm is better cared for and we both gain financially.

"Ten years ago, the Parkfield Farm was poorly fenced. Very little livestock was raised and the fields were over-cropped. Soil fertility was low and corn averaged less than 50 bushels per acre. Needless to say, the farm income was poor.

Livestock and Rotated Legume Pasture Improve the Farm

"But after cross-fencing the farm, stocking it heavily and bringing legume pasture into the rotation, crop yields began to improve. Last year, corn averaged 88 bushels per acre. The farm now supports a highly profitable livestock enterprise. *Good fences* made this possible.*"

**More than 3 miles of the Parkfield Farm is fenced with Red Brand woven wire fence.*

KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILLINOIS

RED BRAND Fence

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Start Flying Now!

Personal Planes Are Useful Farm Machines

GET THE FACTS AT YOUR NEAREST AIRPORT

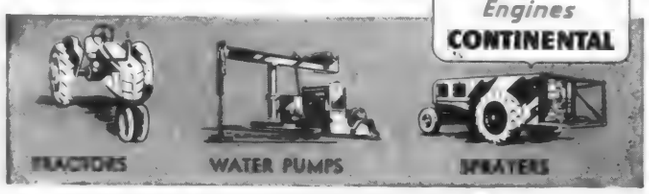
The airplane is more than earning its "keep" on hundreds of American farms, by performing many tedious jobs in a fraction of the time required by other means. Counting or locating cattle, spotting sack dumps or fires, patrolling fences, inspecting or dusting crops, making emergency trips to get machinery parts — these and many other chores which no other farm machine can do so quickly or so well, make it good farm business to own or fly a plane. Why not look into it NOW? The Continental Red Seal dealer at your nearest airport can give you all the facts. No obligation, of course.

Many private fliers who take up aviation as a hobby make the gratifying discovery that personal aircraft, of types suited to their respective needs, quickly pay for themselves in time and money saved. There's still time this season to get your private pilot's license and your plane. It will probably be powered by a Continental Red Seal Aircraft engine. (You'll be smart to make sure that it is.)

Continental Motors Corporation
MUSKEGON, MICHIGAN

45 YEARS SPECIALIZED EXPERIENCE BUILDING ENGINES FOR TRANSPORTATION, INDUSTRY, AVIATION AND THE FARM

POWER BY Red Seal Engines CONTINENTAL



this country where evaporation from a free water surface ranges from 6 to 35 times the amount of precipitation, this problem is a very difficult one. The best method that has been devised to stop the upward movement of the soil water is to create a dry loose mulch on the surface. This dry loose earth with the fewest possible points of contact does not lend itself to the capillary flow of water from below into the air. To go back to the illustration of the sieves it is clear that if they were all wet and all pressed tightly together the evaporation from top would gradually draw up the water from all of them. If, however, the top few layers were dry and were separated from each other the upward movement of the water would be checked. This is exactly what the dry mulch on the surface does. But to create the mulch and to preserve it requires cultivation and cultivation and more cultivation. As soon as the ground is dry enough in the spring the farmer goes out with his harrow and breaks up the plowed land to create the precious mulch. Then after each rain, which packs the surface and gives the soil a uniform moisture, he must go over the land again with his harrow. It is strange that the dry-farmer should be happiest when he has several inches of dry dirt over his fields and should dread summer showers, but it has been found that the light rain will cause a loss of moisture many times the amount of the rain itself, and will draw water from the soil from a depth of several feet unless the mulch is reestablished quickly.

The second great loss of water is from transpiration; that is, the water is drawn from the soil through the roots of the plants and given off by their leaves. Since it requires approximately one thousand pounds of water to produce one pound of dry vegetable matter in this hot dry climate, this loss is enormous. To prevent such loss during the fallow year the dry-farmer is careful to keep his land free from weeds. During the growing season very little can be done to prevent transpiration, but it has been found that the greater the amount of plant food minerals in the soil the smaller transpiration. Therefore the dry-farmer serves himself in two ways by keeping up the fertility of his soil.

In Utah, where almost all of the rain and snow come in the winter months, the crop is planted in the fall sometime between the first of September and the middle of October. With the planting there is a prayer that there will be sufficient rainfall and warm enough weather for the seeds to germinate and a good root system to form before winter sets in. About half the amount of seed that would be sown in humid soils is planted here, since too heavy a crop would use up the available moisture in the soil before it reached maturity. During the growing season little can be done on the crop, but the farmer has plenty to do cultivating the fallow land. In harvesting the crop as much of the plant body as possible is left on the land to be turned under by the plow. Wheat is the major dry-farm crop, but the small grains, corn, sugar beets, alfalfa, potatoes, peas and beans have all been successfully raised. In general the intensive crops are raised on irrigated land, and dry-farming is used for the growing of extensive crops.

Livestock

Like all other branches of agriculture, the livestock industry in Utah began with the entrance of the Mormons into the Great Basin. The first pioneers brought cattle and a few chickens. Later groups brought sheep and pigs. During the first colonizing period the new bands of settlers took with them one or two cows, a few hens, and perhaps a sheep or two, but it was years before any large flocks or herds were developed. Because of the lack of moisture, these men who had been used to keeping a small flock of sheep on their Ohio and Illinois farms, found that their whole approach to the raising of livestock had to be changed to meet the new conditions. Here in the Great Basin it took many more acres to produce the same pasturage. The forage crops that they raised had to be used to feed the dairy cattle. Beef cattle and sheep were pastured on the mountain slopes in the summer and on the desert land during the winter.

In an effort to achieve self sufficiency in all things, the Mormons began raising cotton in Southern Utah in 1857. Though

The FOX does the 3 toughest jobs .....ON THE FARM

● The FOX Pick-up Hay Chopper, with the Mower Bar and Corn Harvesting attachment, together with the FOX Crop Blower, quickly does the three toughest jobs on the farm . . . *Haying, Forage Harvesting* and *Silo Filling.*

Built by the Pioneers of Modern Forage Harvesting and with over 10 years of successful field operation, the FOX is the outstanding machine of its kind on the market today.

With the FOX . . .

- **You can mow, chop and load, in one operation, over 200 tons of grass silage a day.**
- **You can cut corn of any height, chop it into silage and load into wagons ready for the silo, all in one operation.**
- **One man can pick up, chop and load, ready for the mow or stack, 2 tons of dry hay in 12 minutes.**

Write us today. We will be glad to tell you all about this marvelous machine.

R. E. Krueger Secretary

FOX RIVER TRACTOR COMPANY

Pioneers of Modern Forage Harvesting

2397 N. Rankin Street

APPLETON FOX WISCONSIN

a few of many reasons why millions now use and more millions want

NATIONAL Presto COOKERS
REG U.S. PAT OFF.

Guaranteed by Good Housekeeping

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PRESTO COOKERS *are now available in* SETS *of 2 or 3 or in Individual units . . . 2½-quart, 4-quart and 6-quart sizes.*

The Most Remarkable Utensil Ever Invented For Hi-Speed Cooking and Safe Canning!

Unexcelled for quality of construction, mechanical perfection, simplicity of operation and beauty of design, PRESTO COOKERS are the crowning achievement of more than 30 years of pressure cooker development, manufacturing experience and constant leadership.

With the extremely clever indicator-weight, showing 5, 10 and 15 pounds pressure, you can use your PRESTO COOKER for safe canning as well as hi-speed cooking. No jiggling. No listening. No loss of food juices due to escaping steam. (Now available for use with earlier PRESTO models.)

PRESTO COOKERS are so easy to use and so easy to clean. Only PRESTO has the patented HOMEC Seal. Just place the cover on the cooker. Then bring the handles together, and you're all set to perform cooking wonders you never thought were possible. The HOMEC Seal is simplicity itself!

PRESTO Cooked foods are ready to serve, not in hours, but in mere minutes. For example, with proper temperature reached, PRESTO Cooking time for asparagus, peas, spinach is only 1 to 2 minutes. A 4 lb. pot roast is deliciously tender in 35 minutes. Soups and desserts, too, are ready in a "jiffy."

Hi-speed PRESTO Cooking retains more of the natural vitamins and minerals, colors and flavors in foods. It provides more nourishment for the entire family.

This most modern cooking method is highly economical. Saves cooking fuel cost. Kitchens are cooler and cleaner.

REMEMBER, all pressure saucepans are not PRESTO COOKERS! Be sure to look for this name-plate on the cover when you buy . . .

Presto COOKER

GIVEN! With your PRESTO COOKER, you will receive, at no extra cost, a highly colorful 128-page book of recipes, time tables, and easy-to-follow instructions... a valuable manual on PRESTO Cooking and Pressure Canning.

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National PRESSURE COOKER

(Model No. 7)

National Pressure Cooker No. 7 has a canning capacity of 7 quart jars or 9 pint jars. Liquid capacity 16 quarts. National Pressure Cooker No. 5 has a canning capacity of 5 quart jars or 7 pint jars. Liquid capacity 12 quarts. Equipped with inset pans, rack, wire canning basket, and complete recipe and instruction book.

Leading food authorities and the U. S. Department of Agriculture recommend pressure cooking as the ONLY SAFE METHOD *for canning all non-acid foods, vegetables, meats, fowl and fish.*

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For cooking two or more foods at one time . . . no intermingling of foods . . . Simple to adjust . . . Easy to use and clean . . . Easily attached to standard PRESTO COOKER rack.

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World's Largest Manufacturers of Pressure Cookers and Canners

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the climate was suitable for the crop in this section of the state it was found that with the added burden of irrigation the cost of producing cotton ran to a dollar a pound. In 1876 a second experiment was started with the introduction of silk worms into the territory. Mulberry trees were planted and sheds erected for the growing of the worms. Many of the older people in Utah remember, as part of the experience of their childhood, the sound made by thousands of silk worms chewing on mulberry leaves. The silk worm experiment also proved to be too costly to compete with Oriental imports and it, too, was abandoned.

The cold climate in the high mountains, however, was ideal for the raising of wool and the sheep industry has grown to the point where Utah now ranks fifth among the states in the production of wool. In the early days the individual animals clipped a two or three pound fleece, but this has been improved by breeding. Fifteen pound fleeces are not uncommon today.

Turkey raising is a relatively new branch of the livestock industry of Utah, but has grown with great vigor. Turkeys are herded on the range in much the same fashion as sheep, but for a different reason. Almost all of the food and water for the birds is carried to them on the range and they are moved from place to place for the sake of sanitation. Turkey dogs have been trained to help in the management and protection of the flock, and a well trained dog is as valuable to the poultryman as his best piece of equipment.

The growing of beef cattle in Utah has about reached its peak because of the limited amount of range. Like the sheep, the cattle are "put on the mountain" in the summer and either fattened in feed lots or put on the desert range in the winter. This requires a spring and fall round-up with all of the color, hard riding, and fun that is associated with such activity. In general, herds tend to be small, averaging somewhat less than fifty head. Though the maximum number of cattle has probably been reached, there is a real effort to improve the quality of the stock, which is predominantly Herefords.

Clair Christianson, who lives in a small town in the center of the state, might be considered a typical modern Mormon. Like 85 per cent of the members of the Church, he is a farmer. If you were to see him with a group of midwestern farmers there would be little to distinguish him; he has the same red neck, the same calloused hands and heavily muscled forearms, the same habit of chewing on a blade of grass. But you will find that he has a greater feeling for the traditions of his homeland and his people than men from other sections seem to have. He would probably volunteer the information that both of his grandfathers were polygamists; that one of them knew the legendary Porter Rockwell intimately, and participated

in some of his exploits; that the other was one of the first settlers in southern Utah. Clair, himself, spent three years in New Zealand as a Mormon missionary, preaching the gospel like so many other young men of his faith. When he returned he took a two year course at the Branch Agricultural College and then started farming his father's land. Today he keeps a herd of fifteen Jerseys on the four-acre home patch, and has thirty acres of irrigated land on the edge of town where he raises corn and sugar beets. With his brother, Owen, he farms three hundred acres of dry-farm land on Cedar Bench, twenty miles away, where they raise wheat. "Our dry-farm wheat is like the milk from the Jerseys, rich and concentrated," he says. Like 86 per cent of the Utah farmers the Christiansons own their own farm.

IN 1839, on a visit to Utah, Horace Greeley described Young as "a portly, frank, good-natured, rather thick-set man of 55, seeming to enjoy life and to be in no particular hurry to get to heaven." The church President died in Salt Lake City, August 29, 1877.

the team of horses used to work the thirty acre "town plot" and the tractor and combine used on the dry-farm.

Today, a century after the first group entered the Great Basin, the Mormons have conquered an inhospitable environment. Irrigation and dry-farming, the twin base on which they have built their agriculture, have proved a success and they have adapted their livestock industry to the conditions which they faced. Utah today, where 74% of the people still are Mormons, bears witness to the fact that the people have followed the injunction of the great colonizer, Brigham Young, who said, "The business of a Saint is to stay home and make his fields green." ★ ★ ★

This is it—
MODEL 31-A
With built-in Hydraulic Hoist operated by tractor power...does your HEAVY HAULING jobs fast.
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Cobey HEAVY DUTY Wagon

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MODEL 11-A
ALL STEEL RUNNING GEAR

For use with home-made or manufactured platforms and bodies. . . . Wheelbase adjustable in lengths from 90" to 137". Bolster supports adjustable to suit various width bodies.

Automotive-type steering. Roller bearing wheels fitted with 6.50 x 16 six ply tires.

Built of welded hi-tensile steel. Designed to outperform any farm wagon and ELIMINATE the HARD WORK. Its speedy Hydraulic Hoist is operated by power from your tractor through a specially designed universal joint and shaft which you quickly attach to or detach from the tractor power take-off shaft. *This requires no tools.* You do it easily and instantly.

With this wagon you eliminate slow, back-breaking hand pumping and cumbersome auxiliary hoisting devices--you simply switch one of the levers at the front or back and let the tractor power do the work. It stops itself at full dumping angle and you can stop it or lower it at any point.

It carries a 4½ ton payload. The Grain Box has a capacity of 150 bushels.

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The most practical units in the world for farms and ranches

SUSTAINED TRACTOR POWER WITH TODAY'S AC PLUGS

(a plus value of "Wider Heat Range per Plug")

When spark plugs falter, your engine loses power—and this will surely happen unless the Heat Range of your spark plugs is wide enough to match the varying temperatures of your engine.

AC's improved spark plugs have wider Heat Range *per plug*, made possible by a new ceramic insulator material, discovered by AC, out of which came the aircraft plugs used in Allied fighting and bombing planes.

Now you get these better AC insulators—together with other important improvements. You get easier starting, improved idling, sustained engine power. You get fuel economy and plug economy—for the plugs last longer and stay clean longer. You get greater freedom from cracked, blistered or split insulators. Ask your dealer for a set of improved AC's of the right Heat Range for your engine.

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Keep an extra set of clean AC's on hand to use while you have dirty plugs cleaned and adjusted *regularly* at a Registered AC Cleaning Station.

AC SPARK PLUGS

IT'S TAX TIME AGAIN

(Continued from page 85)

as the wheat and corn that he raises, the milk, eggs, and wool that he produces, or the range cattle or hogs that he buys and fattens for market. It also consists of the pay that he may receive for working on a neighbor's farm, wages from another job and the rent, whether in cash or crop-sharing, that he receives from land. Stud fees or the rental of teams or machinery are included in gross income, along with proceeds of insurance which may have been collected from losses suffered. Payments from the A.A.A. also must be included.

On the cash basis the gross income will be all the amounts received during the tax year for any of the above items. The gross income for the farmer on the accrual basis will be shown by the difference between the inventory taken at the first of the year and the inventory at the end of the tax period and to this must be added any sales during the year. Along with this must be listed the amounts of income received from other sources, such as stud fees and rentals that can not be shown on the inventory.

Expenses Against Gross Income

In order to figure the net income, all of the allowable expenses must be subtracted from the gross income. Deductions are permitted for all necessary expenses actually incurred by the farmer in carrying on his business. A distinction is made between an expense in carrying on the farming operation, and costs of permanent improvements to the farm, which are called capital expenditures. A second distinction is made between necessary expenses in operating the farm and raising crops and livestock, and the personal expenses of the farmer and his family. These personal expenses such as food, housing, medical costs and the like are not deducted from the gross farm income, though some of them may be allowed on the same basis they are allowed any other tax payer.

There are many obvious deductions which a person who operates a farm may generally claim. These include seed and plants which are purchased, cost of maintenance, repairs and operation of farm machinery, cost of manure, commercial fertilizers and lime, harvesting costs and drayage or freight incurred in transporting produce and livestock to market. Cost of clearing land for crops, or other developments of land in preparing it for cultivation, may be deducted as expenses prior to the time when a productive state is reached. Necessary maintenance and repairs of barns, fences and tenant houses is also deductible, but similar work done on the farmer's personal dwelling would be considered a personal expense and not allowed.

Money spent for farm labor, including piecework and contract labor is deductible. So is cash spent for food for hired labor.

Put *Yourself* in this Picture

74% of all beef cattle registrations in 1946 were Herefords. Over ⅓ million in the past year.

•

During 1946, Hereford steers topped the Chicago market 87% of the time among straight breed shipments, and for 19 of the first 21 weeks of 1947.

In all of the 48 states there are 35,000 breeders of Registered Herefords. In the past year they recorded over ⅓ million calves. This represents 74 percent of all beef cattle recordings for the period.

Today, 85 percent of the nation's commercial beef cattle are Herefords. Last year 87 percent of the straight breed shipments selling at the Chicago top were Herefords.

From January 1 to May 22, 1947, on 84% of the days reported, Herefords topped the Chicago market. Hereford steers hold the all-time record price for commercially fed steers at Chicago, Kansas City, Omaha, Denver and St. Joseph.

Each year more and more farmers, ranchers and business men turn to Herefords because of their inherent and superior ability to make maximum gains on grass, roughage and other available feeds.

Whether you plan to found, improve or enlarge a herd, start with purebred Herefords—America's most popular breed. Send the coupon NOW for Free illustrated booklets entitled "Herefords, The Beef Breed Supreme" and "This Business of Better Herefords".

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Small ball of earth.

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APPLES: 1 McIntosh, 1 Wealthy
PEARS: 1 Bartlett, 1 Duchess
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6 (1 each) 2 yr. olds ... $23.00

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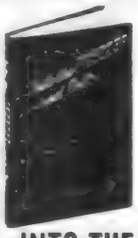

"The A-B-C of food freezing . . . Here is a book to fill a crying need."
—*Flower Grower*

"Never before has freezing information from such an authoritative source been made available to people in this country who have freezing facilities and those who seek them in the near future."
—*The American Home*

INTO THE FREEZER—AND OUT

By Tressler—Evers—Long
256 pages—Cloth bound—Illustrated
$2.50

A complete handbook for users and prospective users of home freezers. Contains step-by-step preparation procedures for all foods; tells how to "budget" your freezer space; what to do in case of power failure; how to package and store foods—in fact, gives the answers to *all* food freezing problems.

THE AVI PUBLISHING CO. INC.

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Food, produced on the farm and consumed by hired labor, cannot be deducted, however, since the farmer is not charged with this part of his crop under income. Neither can the farmer deduct the value of his own labor or that of his wife. Though the Bible says that "the wife seeketh wool, and flax, and worketh willingly with her hands," the Tax Commission holds that the employer-employee relationship does not exist in this case. The tax experts can quote the Scripture to their purpose, saying, "her price is far above rubies." This same ruling may apply to children of the farmer although if a son has reached his majority and has chosen to work on the farm on a salary or on shares, amounts paid to him are deductible. If a minor son makes a similar decision, reasonable amounts paid to him are deductible if an employer-employee relationship actually exists. Such questions must be decided on the facts.

Cost of grain, hay, silage, protein supplement, livestock salt, minerals, mill feeds, or other roughage or concentarte purchase may be deducted. Threshing, combining, silo filling, baling, grinding, shelling or any other machine hire, are legitimate expenses as are cost of twine, baling wire, spray material, disinfectants, poisons, bags, egg cases, baskets, barrels, cans and similar supplies. Also deductible would be veterinary fees and medicine for livestock as well as breeding fees.

The farm's share of expenditures for water, rent, electricity or telephone may be deducted as well as the farm's share of the expenses of a car which is used both for personal and business purposes.

Insurance on farm buildings (except the dwelling of the operator) and on equipment, crops and livestock, the interest paid on mortgages, notes and other obligations incurred in connection with the farm business, may be deducted. In case of payments on mortgages being amortized, principal and interest charges should be separated. Principal repaid is not deductible. Taxes on property and license fees for car, truck or trailer used in the farm business are allowed as deductions.

This listing, of course, does not enumerate all possible deductions but should give an idea of those which are commonly allowed. Final items which are allowed and should certainly be mentioned here are subscriptions to farm magazines and farm organization dues.

Capital Expenditures

There is a fine legal line dividing capital expenditures and expenses which may be deducted. For instance, if lime needs to be applied to the extent of 5 to 8 tons per acre every four years, the cost is regarded as a capital investment in building up the soil, not as an expense in growing a crop. Ordinarily capital expenditures are those which result in acquiring assets which have periods of useful life in excess of one year. Thus the cost of small tools whose useful life is less than a year can be deducted as

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One Dollar Postpaid.

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ARE AMERICA'S YOUNGEST AND SECOND LARGEST BREED OF HOGS
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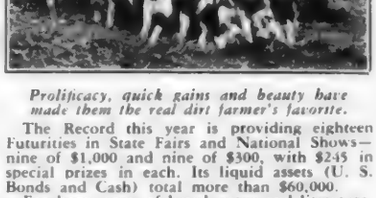

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The Record this year is providing eighteen Futurities in State Fairs and National Shows—nine of $1,000 and nine of $300, with $245 in special prizes in each. Its liquid assets (U. S. Bonds and Cash) total more than $60,000.

For hogs, copy of breed paper and literature, write:

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New Hand-Operated Model 2130 Lubricator. 30 lb. capacity. Develops 5000 lb. pressure with ease. Light weight.

PORTABLE! Aro Model 2647 includes Heavy Duty Grease Gun and Portable Filler. No hose—gun is loaded directly from filler. 10,000 lb. pressure. Ideal for hard-to-reach fittings.

Air-Powered Model 2160 Lubricator. 60 lb. capacity. Light or heavy grease. Portable. Saves time.

To keep farm equipment on the job day after day . . . and reduce maintenance time and expense . . . depend on ARO Lubricators!

Designed for greater speed and efficiency in operation, ARO Lubricators are proving highly satisfactory in farm work everywhere—helping farmers increase their production and reduce costs. You will find practical features and trouble-free performance in the complete new line of ARO hand operated and air powered Farm Lubricators and ARO Grease Fittings. Built to same high precision standards as ARO Lube Equipment used by thousands of garages and service stations. Ask your farm implement dealer. The Aro Equipment Corporation, Bryan, Ohio.

expenses whereas a tractor or a plow would be listed as a capital expenditure and only the depreciation would be deducted. The purchase of breeding cattle or work horses would also be considered capital expenditures though this is optional with the farmer on the accrual basis who may list them on his inventory or list them separately as capital investments and deduct depreciation.

Depreciation

Though the original cost of capital assets is not allowed as a deduction from gross income the government does allow the taxpayer to subtract the annual depreciation of these items. Naturally, different items will have a different rate of depreciation depending on their useful life expectancy. A tractor, for example, may last 10 to 15 years; a combine or corn picker 5 to 12 years, depending upon acreage harvested and care it receives. Binders usually last longer. In general, barns are considered to have a useful life of 40 to 50 years; fences 16 to 20 years; windmills from 20 to 25 years; drainage tile 30 to 40 years; breeding or dairy cattle 8 years; and horses and mules 10 years.

As one mid-west Bureau of Internal Revenue expert said, "Depreciation charts usually mislead and confuse farmers since depreciation is largely based on usage and care. Take a combine for instance. One farmer may be doing his own harvesting and that of his neighbors. This will cause his depreciation rate to be high. Another man will be doing less work with his machine and it won't wear out so quickly. Then there is the care given equipment. Some farmers will keep their machinery in fine shape for years beyond the normal period and finally retire it because it has become obsolete rather than because it has worn out. In this office we find that ten years is the usual rate of depreciation on most farm machinery and don't balk at such a rate."

Here is an example of how depreciation works to reduce the tax. A tractor costs $1,200 and is considered to have a useful life of ten years. Its annual depreciation would therefore be ten per cent of the total cost or $120. This amount would be allowed annually as a deduction.

Annual depreciation, once determined, should be used for each year until the full cost of the property has been recovered. If it becomes apparent that the original estimate of useful life of the property was in error an adjustment in depreciation deductions can be made. This should be explained fully in the tax return. The salvage or trade-in value of the item after its last year should be subtracted from the depreciation for that year.

No taxpayer should ignore the depreciation schedule in his income tax return because it looks complicated or because his records on depreciable assets are not highly detailed. Actually, the Bureau of Internal Revenue Form lists a very simple depreciation schedule which uses reasonable service lives for farm equipment and productive property.

Accounts and Taxes

It is good management to make a rough estimate of probable income tax liability as early in the year as possible. By doing so a farmer can determine whether his probable income is likely to come close to or cross the dividing line between two income tax brackets, possibly subjecting his income to a higher tax levy. In such a case it might prove advantageous to incur additional legitimate expenses such as repairing buildings and equipment and making soil improvement that will conserve and build up the productive capacity of the farm this year as a means of holding down or reducing income. There is no point, however, in making uneconomic improvements in an effort to save tax.

It is possible, also to hold down the tax in any year by delaying the sale of crops or livestock until after the first of the year. Such deferred income, of course, is subject to tax in the new year. This is true only with respect to a farmer on a cash basis.

In addition to these obvious deductions that can be claimed, whether from the regular net income of the farm, or from the income made from some other source (and the two incomes can be lumped together for income tax purposes), there are many borderline deductions. One man purchased a Virginia farm which had a dilapidated fence around it. He proceeded to "repair" the fence by virtually tearing it down and putting a new fence completely around the place. He deducted the whole amount spent on "repairing" the fence on his tax return and it was allowed without question. However, in other instances, agents have disallowd such a deduction and have made the taxpayer place costs of such a fence in the capital expenditures column, thus being allowed only five per cent depreciation deduction each year for its estimated twenty year life. The whole question revolves around whether it is a bona fide "repair job" or whether it is a brand new fence and hence a capital expenditure.

There are various ramifications and exceptions to all of the matters discussed here which the taxpayer should familiarize himself with. A detailed analysis may be

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A tough galvanized, fine wire base—¼-inch mesh. Every joint and wire imbedded in a cushion plastic for double reinforcement. Transparent Plastic applied on both sides, fusing everything into one solid weatherproof sheet. Highest Ultra-Violet transmitting and most transparent, flexible window material on the market.

$12 SAVED IN ONE MONTH'S FUEL BILL!

This test of Warp's Window Material was made on a modern, insulated, 16-room brick home, heated by gas, in winter weather averaging 29°F. Inside temperature thermostatically controlled at 72°F. day and night. For one month, *without* storm windows, gas used cost $31.50. But the next month, *with* storm windows of Warp's Material, the gas used cost *ONLY* $19.50! A cash saving of $12! This 38% saving would have been *EVEN MORE* if test had been made on a poorly insulated house with no weatherstripping around doors and windows.

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Tests at Warp's Experimental Farm show that pullets that started laying when only 5¼ months old, layed 90% more eggs during the first 2 months when kept under one of Warp's Spectronic Window Materials than hens that were kept under common glass. Poultry or livestock raisers can always be sure that any window materials with the name Warp's printed on the edge will really produce faster growth, more eggs and more meat at less cost.

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Warp's *new* all-plastic window material—yet thoroughly tested in actual use. Tough plastic cords, perfectly laminated between two sheets of clear waterproof plastic. Strong, durable, weatherproof, very transparent. *Stays* taut on windows; elasticity of plastic cords increases resistance to abuse. Supplies Sunshine Supplement D.

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Fine Mesh Wire Base. Extremely Durable for Long Service. Galvanized wire screen cloth imbedded in a solid sheet of exceptionally clear, waterproof plastic which transmits and diffuses over 50% of the sun's Ultra-Violet Rays. Shatterproof, unbreakable and airtight. As flexible as window screen.

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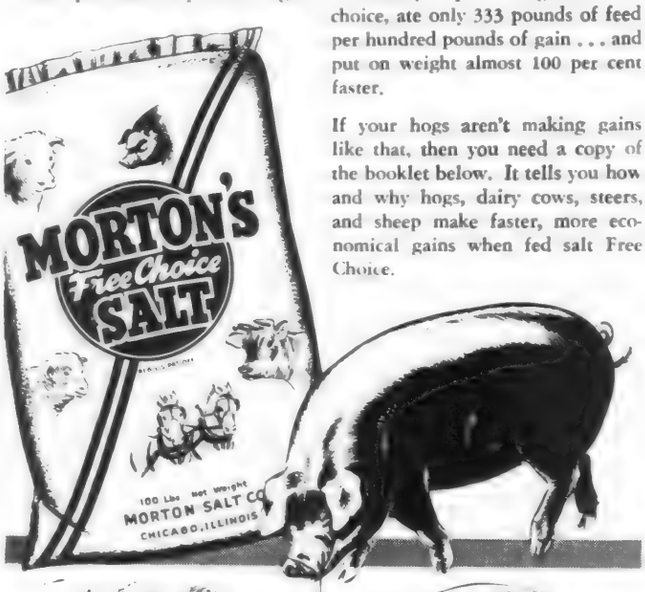
If your hogs aren't making gains like that, then you need a copy of the booklet below. It tells you how and why hogs, dairy cows, steers, and sheep make faster, more economical gains when fed salt Free Choice.



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Every farmer and feeder should have this practical well-illustrated, 40-page book which tells in detail, how to feed salt for the greatest gains. Also provides plans for making practical, economical feeders. Only book of its kind. A penny post card will bring your copy by return mail, postpaid. Morton Salt Co., 310 South Michigan Avenue, Chicago 4, Illinois.

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Morton's Free Choice Salt is especially developed for more profitable livestock feeding. It's pure — easy to feed and easy to use for mixing. Be sure to ask your dealer for it by name — MORTON'S FREE CHOICE SALT.

found in publications such as "Compendium On Farmer's Income Tax" published by the Commerce Clearing House, Inc., Chicago, Ill. It may be purchased at two copies for $1.00. This firm does not wish to handle less than this amount of money. You will find it well worth your while to buy two copies and give one to a confused friend. On the subject of booklets of popular, simplified methods of computing income taxes, one corn-belt Bureau of Internal Revenue Chief Auditor practically foams at the mouth. He found one of his field men using such book as a guide in talking to farmers, and he offered to bet him that on any page in the book he could find misinformation. After the field man had parted with $3.00 for the first three pages he picked, he decided that the book wasn't so good. Most of the Internal Revenue Offices have men who are experts on farm taxes, and they will help gladly if you don't come in on the last day.

There is only one set of tax laws and only one set of regulations and rulings issued, but interpretations of these laws and regulations vary from one region of the United States to another.

"We'd like to have uniformity in administration of the tax laws, and we work toward uniformity all the time," an expert in the Department of Internal Revenue in Washington pointed out recently. "With thousands of agents and thousands of regulations and rulings, it is obvious that there will be differing interpretations of what is and how much is deductible. That's why the United States Tax Court stays busy all the time."

Under present conditions, it would seem that most persons are claiming all the deductions possible. Some of these deductions are being disallowed. The taxpayer is not to be blamed if, in making an honest return, he claims deductions which are allowable, or have been allowed, in some sections of the nation but may not be allowed in his particular jurisdiction. In case a deduction is disallowed the taxpayer can file a protest at the nearest office of Internal Revenue. If he wants to carry the appeal further, he can go into the U. S. Tax Court, which sits in various parts of the country.

Hobby Farming

At this time there are several cases before the U. S. Tax Court relating to this question. Can a person pour large sums of money into a farm ostensibly being operated for profit and claim the losses, or should there be a distinction between *operating* a farm and *developing* a farm?

The point is not as academic as it may seem. If you owned a farm and spent $1,000 a year on fertilizer, you could deduct the whole $1,000 if you could show that you used the fertilizer operating the farm instead of developing the land. Likewise, you might not spend inordinate amounts of money on fencing if you were merely operating a farm, while if you want to develop a farm you might put a whole lot of money into fencing and driveways.

It is noteworthy that the courts have decided in favor of the taxpayer on large "losses" for farm operating expenditures *only* in cases in which the person claiming the losses consistently had maintained that he was operating the farm for business and not for pleasure. So-called "gentlemen farmers," or those who have kept farms for pleasure, have not been allowed the deductions given those farming for profit. Elaborate iron gates, beautiful shade trees and such cannot be legally claimed as deductions. Ornamental cupolas, graceful trellises, and artistic murals may add to the rococo elegance of the old barn but they cannot be deducted as maintenance or repair expenses.

If a farm is operated for recreation or pleasure and not on a commercial basis, and if the expenses incurred in connection with the farm are in excess of the receipts therefrom, the entire receipts from the sale of products must be ignored in rendering a return of income. Such expenses in excess of receipts and losses are not deductible by "gentlemen farmers" because they are not incurred in a trade or business or transaction entered into for profit.

The question of the taxpayers's intention to operate for profit is a matter to be determined in every case from the facts and circumstances. Ordinarily, the fact that the farm has not been operated at a profit for many years is not enough to war-

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rant the disallowance of farm expenses, even though it is shown that the owner is pursuing other business interests. The rule as to "hobby" farming has been applied to the operation of a farm for the breeding and developing of race horses and the conduct of a racing stable, in arriving at the determination of whether the taxpayer was entitled to deduct business expenses. If racing horses was a "pleasure" and "recreation" the losses were not allowed.

A farmer, under the law, would be one who produces for profit and assumes the risk involved in such an enterprise. So, if you are losing money running a farm in these years when everyone makes a profit, look out! Uncle Sam may decide you are riding your hobby for a fall, taxwise speaking.

* * * *

THE DISC PLOW

(Continued from page 27)

tractor speeds the dirt can be thrown well away from the edges of a ditch eliminating the possibility of having it washed back into the ditch at the first freshet.

The disc plow, or its cousin, the tiller disc, are standard equipment on the wheat ranches and farms of the West. It has also been a popular instrument in the South for many years, for it was designed for use in Southern soils where it does every tillage job . . . turning under cover crops, preparing seedbeds, terracing, and, with seeding equipment, planting small grains. The use of the disc plow in the South also brought about the use of the one-way disc plow which is now doing the work of the double-action disc harrow in some sections.

In the southern part of the United States, and in Cuba and many other South American countries, the disc plow is indispensable. It is an absolute essential for breaking new thicket, such as palmetto, and heavy brush land. It cuts and turns 2 to 4 year old, thickly matted sugar cane stubble ground. It is an excellent plow to turn under pineapple cuttings, which are left on the field as residue after harvesting. All pineapple top growth is cut like silage, chopped with a special cutter in the field after the pineapples are gathered. This blanket of refuse is sometimes 10 inches deep on the surface and must be turned and covered before the next planting.

To turn and cover this refuse properly, plows with 26 to 36-inch discs have been designed. Heretofore, only 3 crops could be planted in 5 years, but with the large discs for deep plowing and good coverage, 4 and in many case 5 crops are grown and harvested in the 5 years.

The Disc Plow Hitch

It is a simple matter to adjust and hitch the disc plow. The horizontal line of draft is exactly the center of cut. On the pull type of disc plow the drawbar should be attached from tractor to plow so that it is parallel with the furrow wall. The dis-

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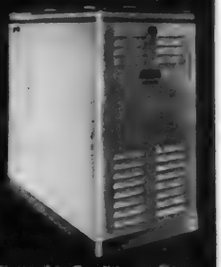

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I have specialized exclusively for 20 years in this country, my Swiss ancestors 100 years, in propagating the finest varieties of these trees.

tance from the ground should be the same at both hitch points. On the pickup, or directly connected style of disc plow, the draft lines are built into both units—power and plow—and the only requirements are to properly assemble and attach to the tractor. Engineers have taken care of and simplified the hitch problems on these plows; problems of vectors and friction make the proper attachment a mystery to many users.

The disc plow will do good work over a long period of time if the discs are kept sharp and all are set level to make the cut at an even depth. If they are not set level the plow will ridge the soil. This is a very unsatisfactory soil condition for drilling grain because it slows down the recommended speed, and later when harvesting the surface roughness also slows down the combine or binder. Equal depth adjustment of all discs is highly essential.

Sizes and Types

There are two types of disc plows, the standard and the one-way; the latter is known by many names but is usually called the wheatland disc or tiller disc. On the standard disc plow each disc is separate and has its own bearing, therefore, each disc turns separately. On the one-way disc plow all discs turn together, being mounted on one long shaft. The standard disc plow usually has 24 to 26-inch discs with deep concavity; the one-way disc plow generally has 20 or 22-inch discs with a shallower concavity. The disc plow has more flexibility of adjustment than the tiller disc. The discs on a plow have a scooping set; on the tiller they are set vertically.

Most disc plows may have a depth variation of from 4 to 16 inches and width of cut per disc from about 7 to 12 inches. On some disc plows the angle of the disc with the vertical plane may be varied for better penetration, pulverization, and turning. Some disc plows are also made to permit widening of the space between adjacent discs for better handling of heavy trash.

The major implement manufacturers make a variety of disc plows and disc tillers, ranging from light, single disc jobs to extra heavy tools with sixteen discs. Your local implement dealer will have information on the types adapted for your locality. The size of discs depends on the purpose, those made for working cane and pineapple fields being the heaviest. A number of concerns make seeding attachments for both disc plows and disc tillers. The distinction between the disc plow, the disc tiller, terracers, and other types of disc tillage implements is more academic than real, and the manufacturers use the various designations somewhat loosely. Whatever the name the manufacturer chooses to call his disc tool, its use on your farm is worth investigation and serious study. It may shorten hours in the field and turn out a better crop. ★ ★ ★ ★ ★

CHRISTMAS TREES

(Continued from page 45)

It becomes a heavier producer each year.

F. C. Gaylord, who has a Christmas tree farm near Klondike, Indiana, hires all of the labor for planting and harvesting his trees for market, but he personally supervises the work and markets the trees. He has proved to his own satisfaction that it is possible to net a good profit even when he pays labor costs. He started his plantation seven years ago when he planted 2,100 trees on one acre. Some of the spruce failed to grow and the following year, he replanted 600 of them. Gaylord favors pines in his planting for they are easier to grow and hold their needles better in the house. Last year when the field came into production, Gaylord sold 500 trees wholesale to a local chain store and to each one was a tag that read, "These trees were grown in the hills of Klondike." The trees sold easily for the public liked the shape they had developed through yearly pruning.

He valued the land at $50.00 an acre. The 1945 marketing averaged gross receipts of $1.00 a tree, with harvesting costs of 15 cents a tree which included cutting and stacking by the road for the buyer's truck. This made an income from the 500 trees of $425.00. The initial cost of planting was $125.00 which was distributed over a two-year period. The 2,100

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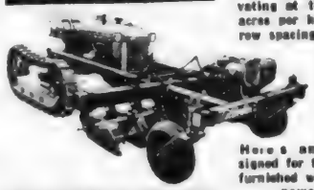

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TRACTOR TILLER

Here's an implement designed for the market grower, furnished with motor drive or power take-off from suitable tractor. It harrows, discs, levels, and packs the soil in one operation. Made in two sizes, 4' and 5'. Ask for complete details.

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The original all-American tilling combine, ARIENS TILLER, harrows as it discs as it plows . . . produces a completely pulverized level seed bed in ONE operation. Models to meet every day requirements. Widely used by market growers, nurserymen, horticulturists, landscape architects, truck gardeners, etc. Ask for complete details and name of nearest distributor.

ARIENS COMPANY
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trees were purchased from a commercial nursery at $32.00 a thousand. Labor costs for preparing the ground and planting in 1938 were $30.00, bringing that year's cost up to $94.00 an acre. Added to this was the second year refills which came to $31.00 an acre. At the end of the rotation, the net profits will be about 25 cents per tree. Of the 2,100 trees planted, about 2,000 will go to market, making a net profit of $500.00 for the eight years, or a yearly profit of $62.50 per acre.

If Gaylord had merely wanted to reforest the field rather than make it produce a yearly crop of Christmas trees, he could have planted it in exactly the same manner. Then, as the trees reached Christmas tree size, he could have sold half of them to help pay for the planting. The other half would have proper spacing to grow into timber. The ones cut out would have been selected so that the field would still have an even covering of forest trees.

What Your State Will Do

Farmers in the Midwest can often get help from their state foresters in establishing Christmas tree plantings. Aid varies from state to state. Some of them furnish seedlings at about ten dollars a thousand, some furnish directions, and some furnish both, but all attach certain restrictions to this service. None of them allow farmers to resell the trees with roots attached if the seedlings come from state nurseries.

Illinois

This state supplies seedlings for trees that can be sold as Christmas trees. These are acquired through the State Forester, Division of Forestry, 301½ Monroe Street, Springfield, Illinois. This office will also supply information on planting.

Indiana

Seedlings for Christmas tree plantings can be obtained from the State Division of Forestry, Indianapolis, Indiana for $10.00 a thousand. These may be sold for holiday trees and the only stipulation is that they cannot be resold with roots intact. Aid in planning your plantation is also available from the Extension Forester, Agricultural Extension Service, Lafayette, Indiana.

Kansas

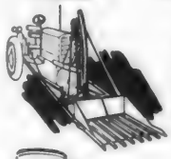
For technical assistance and evergreen seedlings write to the Extension Forester Kansas State College of Agriculture and Applied Science, Manhattan, Kansas. The seedlings supplied by this agency can all be sold as Christmas trees as long as they are cut and not dug.

Kentucky

Christmas tree plantations are scarce in Kentucky. The Division of Forestry, Frankfort, Kentucky, can give help in making plans but has no tree seedlings available of the species that make good holiday trees.

Michigan

The Forestry Department of The Michigan State College, at East Lansing, sup-



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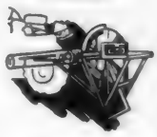

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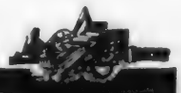

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plies trees that can be used for Christmas tree plantings. Extension foresters here offer assistance to farmers who want to make plantings but the lack of trained personnel hampers them somewhat.

Missouri

County agents in every part of the State distribute seedlings for farm plantings, but these cannot be sold as Christmas trees except for those that are removed to improve the planting. Yearly planting meetings are held throughout the state to give landowners help in developing plantations.

Ohio

Help and seedlings are available through the State Forester, Ohio Agricultural Experiment Station, Wooster, Ohio. Farmers are requested to plant 900 evergreens to the acre and this planting may be thinned down to 600. The excess can be sold for Christmas trees.

Tennessee

Christmas trees are not grown to any extent in this state, because red cedar grows so abundantly there and serves the purpose in most homes. Seedlings, however, can be obtained from the State Forestry Division, Department of Conservation, Nashville, and used for Christmas tree plantings.

West Virginia

Seedlings can be purchased at prices of four to eight dollars a thousand from The Conservation Commission at Charleston. These can all be used for Christmas tree plantings, but this state like others is hampered by shortages of personnel to help with the planning.

Wisconsin

This state recommends that a person buy a 40-acre tract of second growth woodland in which young balsam fir is coming along well. In these stands, the biggest problem is clearing out the hardwoods, such as birch and aspen. The Wisconsin Conservation Department supplies trees than can be planted and later harvested and sold as Christmas trees.

WHAT YOU WILL HAVE TO PAY FOR 1,000 SEEDLINGS (Approximate)
Four Year Transplants

Norway Spruce	$ 50.00
Blue Spruce	75.00
White Spruce	100.00
Scotch Pine	70.00
Red Pine	40.00
Douglas Fir	40.00
Balsam Fir	65.00

HOW LONG WILL IT TAKE A CHRISTMAS TREE TO GROW SIX FEET IN THE MIDWEST?

Scotch Pine	5 to 7 years
Red Pine	5 to 7 years
Norway Spruce	8 to 10 years
White Spruce	8 to 10 years
Douglas Fir	12 to 14 years
Balsam Fir	10 to 12 years

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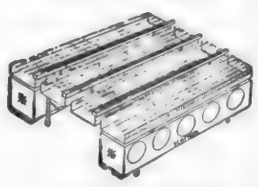

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VENTILATE AND SAVE

(Continued from page 33)

around all the corn, then there is no harm done, for the change of temperature tends to prevent mold developing and the change of air keeps it cool. The drying takes place anytime when the vapor pressure of the air is lower than that in the corn. Thus, throughout the year, from September to September, ear corn constantly changes its moisture content in the well ventilated crib.

It usually is late in May or even June before the corn dries to less than 14 per cent, the point where it is safe to shell and store in a tight bin.

Other Types of Ventilators

There are other ways of ventilating ear corn in cribs. The use of rotating cowels with a long vane to hold the opening into the wind for downward draft ventilation has been fairly effective in preserving ear corn in 12-foot round steel cribs.

A NARROW CRIB admits air.

A slatted partition on large slatted flues placed either lengthwise or crosswise through ordinary cribs is also recommended.

Many corn cribs in the mid-west are provided with slatted floors about two feet above the ground. This permits the upward movement of air through the corn. It is effective in preventing the growth of mold commonly found near the floor of ordinary cribs.

A basic principle to keep in mind in all ventilation is that both sides of the crib or bin should have free circulation of air. When wind blows against one side of a building it creates some pressure. There is a similar suction at the leeward or opposite side. Thus, cribs should not be surrounded with sheds that do not have free ventilation. It also illustrates why corn stored in the driveway between cribs will usually spoil and will also cause corn in the side cribs to mold or otherwise go out of condition. Corn stored in this manner cannot survive warm weather unless it was very dry before it was stored (less than 14 per cent moisture).

Forced Air Ventilation

The use of a natural flow of air circulated by flues through a crib of corn takes little engineering knowledge and only the average amount of skill with a saw and hammer. Common sense will often be a

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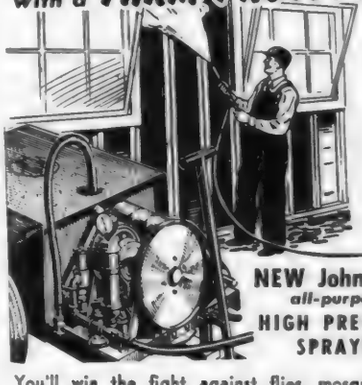

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sufficiently sound guide to determine size, materials and installation.

The same is not true of forced air ventilation systems where factors of fan sizes, speeds, cubic feet of air per minute, air pressures and such technical considerations complicate the problem. The professors themselves who have been experimenting with forced air systems admit there is yet to be designed the perfect system that works with 100 per cent efficiency.

The use of fans to dry corn and grain, however, is here to stay, and there is enough information available to warrant every corn grower going to the trouble of analyzing his own needs and installing his own system. State Extension departments and county agents, as well as trained men at your local utility company, are available as planning boards to help you out with your problem.

Early in October, 1945, Raymond Carr of R. F. D. 2, Williamsburgh, Ohio, installed electric drying equipment in his corn crib. It saved him 1,000 bushels of corn.

The drying installation was simple. It consisted of a duct two feet wide and two feet high built down the center of the crib floor. The duct was covered with wire screen. At one end there was a blower fan that delivered outside air into the duct and forced it through the corn. No heat was used.

The crib in which the corn was dried was 8½′ x 34′ x 12′ high on the high side. The sides of the crib were boarded tight to a height of 3 feet and on the fan end to a height of 8½ feet. Carr thinks he would get more efficient use of the air if the sides were boarded up to 7 feet.

The duct framework was made of 2 x 6's and was covered with wire fencing to support the corn. The duct was stopped 4 feet from the end of the crib to prevent excessive air leakage. Six feet back might have been better.

The blowing was done with a 24-inch propeller type fan directly connected to a ½ horsepower motor. The fan ran at 1,750 rpm and was rated to deliver 4,000 cfm (cubic feet per minute) of air against a static pressure of ½-inch of water. With the wire covered duct, the back pressure probably did not reach ½ inch. The fan cost $137.00 with motor. A similar fan equipped with V pulleys and belt but without motor would cost around $90.00. The total cost of the fan and duct system exclusive of labor was approximately $150.00. (All 1945 prices.)

Shortly after October 1, the crib was filled with corn to a depth of 9 to 10 feet over the duct. The moisture content of the corn was high, being between 33 and 35 per cent. The fan was operated most of the time for the first thirteen days. During the first week, the weather was warm and dry. Enough moisture was taken from the corn to cause it to settle 8 to 10 inches. No measurements were

taken on air movements through the corn, but Carr noted that the silks on the ears were being moved by the air when the fan was running.

The first crib of corn was fed out during the winter months. There was no mold in it. Last spring, another crib of corn, which had not been dried, started to heat. It was moved into the crib with the fan and dried.

The cost of electricity for drying the 1,000 bushels of corn was $5.62.

Carr plans to use this same crib for forcing air through combined wheat and soy beans. In good seasons for corn, the fan will also permit harvesting corn several weeks earlier. That will mean earlier marketing and more time to prepare fields for wheat.

There were four other corn drier installations similar to Carr's in the Cincinnati area in 1945. All of the farmers felt the costs would be saved in two or three years. Carr consulted with his local power company in his selection of a fan and the size of the flues.

There are a number of methods of getting the air to the corn. One is to build a false floor about two feet above the permanent floor of the crib and force air into this chamber and into the corn through openings in the false floor. Another is to construct flues through the crib, connect them with a master flue, and distribute the air in this way. Another is to construct a flue along the side of the crib and place the fan at one end. The crib can be made air-tight by nailing a strong paper to the walls and floors. If you have a hay drying system installed, the same fan can be used for the crib dryers. An ensilage blower can be used, but it is usually not efficient.

One farmer built a concrete block building 16 feet wide and 32 feet long and 12 feet high. (See Fig. 4.) A slatted floor about two feet above the ground serves to distribute air furnished by a multivane fan. The corn was husked with a mechanical picker and placed in this bin in early October. There was about 33 per cent moisture in the corn when stored. This corn was dried to about 18 per cent in three weeks.

There are a few basic principles to consider in using forced air ventilation. During weather warm enough to encourage mold, which usually is over 50° F., it is advisable to operate the fan continuously throughout the day and night. The grain gets warmer during the warm part of the day. The heat from the air raises the vapor pressure of the moisture in the grain. This forces the moisture to leave the warm grain and move to the cooler air. Thus, the actual drying may be greater during the night when the air is cool. About the only time when the fan should be stopped is during fog. During fog, the free particles of water should not be carried into the grain.

When grain is warmer than the outside air, the fan may be operated because some

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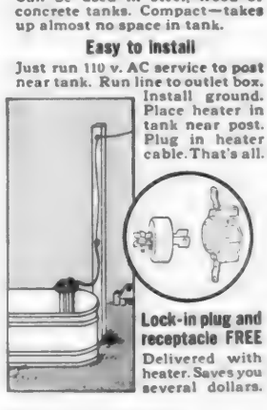

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drying occurs even if the air has a high relative humidity such as usually exists during rain or during sultry weather. A good rule to follow in fan operation is to operate it continuously, with the exceptions noted, until the desired cooling or drying has been obtained.

So far, ventilation systems that use only natural air have been discussed. Heated air drying is more complex and cannot be generally applied safely on all farms. There are fire hazards and grain damage possibilities which require careful design of the equipment and close attention to intelligent operation. Heated air drying has been confined largely to large dryers at large grain elevators and seed corn establishments.

Add These To Your List

A summary of additional facts on flue ventilation may be of interest. In most cases, the bins were not filled more than seven feet deep. This requires air pressure equivalent to ½-inch of water to deliver about one cubic foot per minute per cubic foot of corn. Tests indicate that the resistance varies about as the square of the velocity. Thus, to get twice as much air through the corn will require about four times as great air pressure. Most farm bins and cribs in the Corn Belt do not have greater depths than seven or eight feet so that forced ventilation is a practical method of drying grain or ear corn on most farms.

It is important that fine weed seeds,

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DEDUCTIONS

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16%	½c
16½	1
17	1½
17½	2
18	2¾
18½	3¾
19	4¾
19½	5¾
20	6¾
20½	8¼
21	9¾
21½	11¼
22	12¾
22½	14¼
23	15¾
23½	17¼
24	18¾

FURTHER REDUCTIONS: ½c for each pound test weight under 51 lbs. per bushel: ¼c reduction for each 1% over 5% damaged kernels; 1c reduction if sour; 1c reduction if weevily; 1c reduction if heating; 5c reduction if hot. The lower the price, the harder the moisture percentages hit, for price penalties are computed in cents. In Sept., 1947, No. 1 corn was quoted at $2.60½; sample grade, moldy and damaged, at $1.83.

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cracked grains and other trash be removed from the grain or corn for effective ventilation. Air will follow the path of least resistance so any clogged area will not be properly ventilated. Even a small amount of spoilage may greatly reduce the grade of the entire bin if it is mixed with the good grain. The drying of corn presents a difficult problem during the cool months of the year. In warm weather, corn will heat and mold readily if the moisture is above 14 per cent. Thus, the use of flue ventilators to dry ear corn in cribs, located in open spaces, is recommended.

Forced Ventilation of Grain

Forced ventilation to dry out grains such as shelled corn, soy beans, wheat, oats and barley, has been found satisfactory. This works best when the moisture content of the damp grain is only a few per cent over the dry limit of about 14 per cent. Tests conducted in forced ventilation of wheat, oats, barley and soy beans show it effective in preventing mold and in drying the grain that has a small amount of excess moisture. The best method is to connect the flues to a large cross tunnel into which the fan forces the air. The installation is similar to that of the "Ohio System" of drying hay with forced ventilation. (See "The Gamble's Gone from Haying," FARM QUARTERLY, Spring 1946.) The air can be directed to any or all the flues at any time. The main tunnel is large enough to reduce the air velocity to less than 1,000 feet per minute.

The forced ventilation of grain is usually done in warm weather so that drying is more rapid than it would be in the cold months. Grain usually has only a few per cent of excess moisture, whereas corn has much more moisture to dry out. Corn rarely dries below 18 per cent moisture from harvest time until spring. This accounts for the recommendation of drying corn in the ear with flue ventilation. Flue ventilation such as is used for corn is a "will do" for grain where forced ventilation is not feasible due to lack of power to operate fans.

What's Ahead

The fundamentals of ventilating corn by the natural circulation of air through flues are well understood and can be used by any farmer with complete confidence. Exact procedures in forced air drying have not been thoroughly worked out at the present time but are scheduled for the very near future. Among the items to be standardized are sizes of fans, motors and flues and methods of installation. However, any farmer will find that even with the present incomplete information, he will be able to save a good percentage of his spoilage by installing a forced air system. It may not work 100% efficiently, but he can't lose and the cost of any system is bound to pay for itself in a short time. In three or four years, he can afford to remodel the outfit. ★ ★ ★ ★ ★

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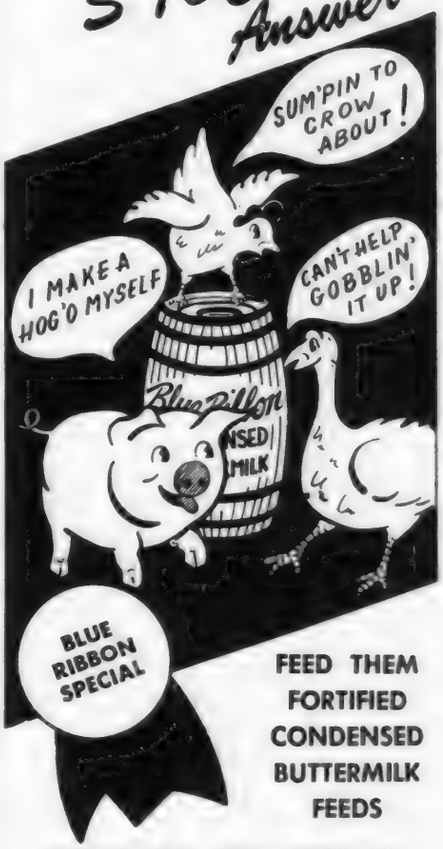

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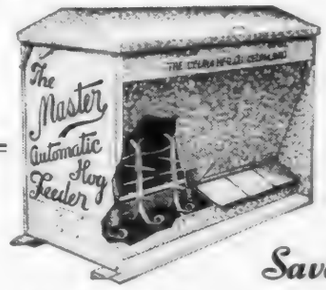

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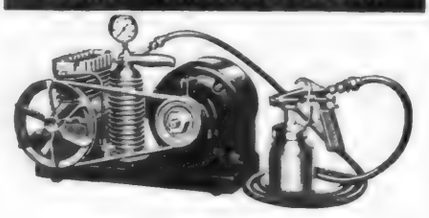

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THE FRIENDLY BACTERIA

(Continued from page 75)

can be ordered withdrawn from sale in Indiana. Other states requiring a yearly registration are New York, Ohio, Kansas, Maryland, Delaware, Wisconsin, and New Jersey. A number of other states check the quality of inoculants from time to time, The U. S. D. A. runs a large number of tests each year and make their findings available to those who write the Division of Soils, Fertilizers and Irrigation, at the Beltsville Maryland Research Center.

INOCULANTS pay their way at the feed trough. The Illinois Experiment Station developed this chart.

To select an effective inoculant, it's a good idea to get the recommendation of your county agent, or contact the Extension Service at the State University. Then buy only known brands put up by manufacturers who have been in business for a reasonable length of time. Perhaps the most important check-point is your dealer. See that he understands what an inoculant is, and that he has handled it carefully up to the time you buy it.

For a change we have bugs that will work for us; all they need is a start in life.

★ ★ ★ ★

CHICK SEXING

(Continued from page 49)

sexors to leave Japan to demonstrate the craft in foreign countries, going in 1930 to England, Belgium, and France. He induced his sister to come to Japan for instruction in 1935. She now works with a Japanese partner, Koy Saito and the two of them average 1,000 chicks an hour.

A sexor must have a quick eye and fingertips trained to the touch of a violin player. He places before him a box full of assorted chicks as they come from the incubator. On either side of this box are two other boxes marked respectively, "Pullets" and "Cockerels." At the rate of 400 to 1,400 an hour, he picks up the chicks, turns them backside up, manipulates them expertly, takes a quick gander, and tosses them into the proper box. Even a chicken man would call the male and female organs identical. The sexor must mark the almost microscopic difference and make rapid fire decisions at the rate of one every two or three seconds, separating the males and females. The Pullorum free females from tested stock which will eventually be the layers, have brought up to 20c each; the males go to the gas chamber and are destroyed, or find a lazy market at 1½c each. They cannot be profitably raised as broilers when feed is high, but sometimes

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Dept. 400, Union Stock Yards, Chicago 9, Illinois

end up in downtown pet stores where suburban chicken raisers buy them.. These prices, of course, are for the laying breeds, such as the White Leghorn. Sexing is, of course, not as important for the varieties raised for meat.

Let's sit down beside an expert chick sexor and watch how he manipulates his nimble fingers and deft hands, and how he makes his flash decisions. He has a strong 200-watt light to give him clear vision, and he may wear a gadget something like an optician's microscope. He must be able to concentrate because he is making split-second decisions and he likes to be at least 95% right. He has spent months in practice to become a first-class expert, and has examined thousands of chicks. Hour after hour and day after day he has sat on his stool looking at the rear elevations of day-old chicks, noting the fine distinction of the male and female organs.

He reaches into the chick box and grasps a chick with his left hand between the thumb and forefinger. He lifts the chick a short distance from the box and gently but quickly applies pressure to the abdomen just below the vent. This will empty the vent of accumulated fecal matter. This pressure is applied in the same manner one would use in pressing the bulb of a toy water pistol or syringe. For an obvious reason he points the chick away from him. The chick is then lifted to eye level, the feet grasped in the right hand and with a little movement of the finger, the vent or cloaca is inverted. There is the male eminence! It's difficult to see, but watch the next chick. Pick up—squeeze—look—drop. Even a layman could sex this next fellow for the eminence is conspicuously male. The art is to cause the eversion of the cloaca and then manipulate the inner walls to bring out the size and shape of the male or female eminence. The eminence differs in size and shape. After all there isn't a great deal of difrence in the sex of chickens. Scientists can easily make a hen out of a rooster by tinkering with their glands. Figures 5 and 6, the a and b male types are representative of about 80%, also the a and b female types, but the art comes in distinguishing between c-d-e and f.

While methods of holding the chick and everting the cloaca may differ, the object is the same, to bring the eminence into view. American sexors have developed a method slightly different from the Japanese, and individual sexors may have pet variations of their own.

In 1934, Yogo claimed to be able to determine the sex of a chick immediately before he started to evert the vent, even before he looked at the eminence. This was hard to believe. It sounded like Oriental hocus-pocus. By this time, however, Yogo had sexed three to four million chicks and he proved he could do it.

Ben Salewski also claimed that he could sense the sex of the chick by touch as he

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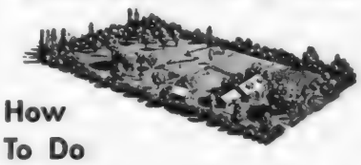

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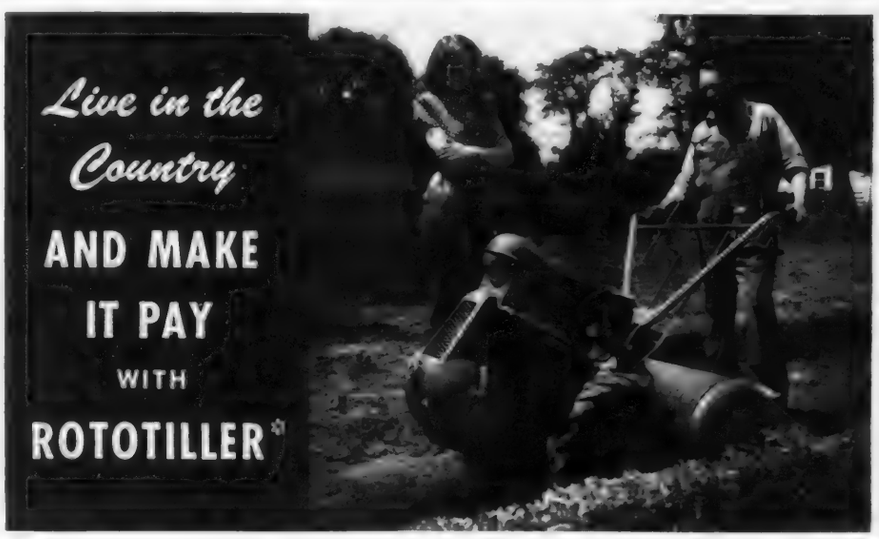

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everted the vent. No doubt there are other experts who have felt and used similar intuition in sexing. Ben learned to sex chickens in Washington in 1936. He has developed an accuracy of 99.5% and cruises along at the rate of 900 to 1,000 chicks per hour. Some sexors claim the health of the chick is improved by the forced bowel movement which accompanies sexing.

It was proved a long time ago that no harm was done in sexing the small, fluffy, baby chick. Good sexors practice loose handling and avoid rough treatment that might injure the chick. The sexor must learn to relax physically, but he must at the same time be able to concentrate closely. This is difficult and so exacting that hours are short and are often broken by frequent rest periods.

Sexing has been adopted and accepted by the poultry industry. For a long time some were skeptical, but now both poultrymen and hatcherymen accept the cold, efficient facts as sound economy. Since the days when chick sexing started on the Pacific Coast to get rid of the useless Leghorn cockerel, it has spread until it is now practiced wherever chickens are raised commercially. Ralph Walsh of the Washington Cooperative Chick Association, Centralia, Wash., says, "Here in Washington we sex over 80 per cent of all Leghorn chicks hatched. It would be hard to get along without chick sexing now." The poultryman who specializes in a laying breed wants to raise pullets and doesn't want to be bothered with the cockerels. He might make a little money on them, but his pullets will do better with more room and will give him a higher return on his feed. If a hatchery owner can guarantee all-pullet sales he can ask a higher price. The broiler man can get a cheaper chick by buying only cockerels which will grow faster for him under management designed to produce meat.

Because chick sexors regard their calling as an art, all do not use the same technique. No one cares how an artist holds his brush; a high percentage of accuracy is what the poultryman pays for, and he is not concerned how it is achieved as long as his chicks aren't harmed.

There are other methods of determining the sex of chicks, but none compare favorably with the method described in this article. Some persons claim to have a sixth sense which enables them to determine sex by the simple means of looking the chick in the eye. Another method, which is thought by some to be fairly accurate, is to suspend the chick by the back of the neck or by the feet. It is claimed that the females will fight and squirm, the males will hang limp and inactive. There is no hocus-pocus about the Japanese method—it is apparently here to stay.

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HAMSTERS

(Continued from page 80)

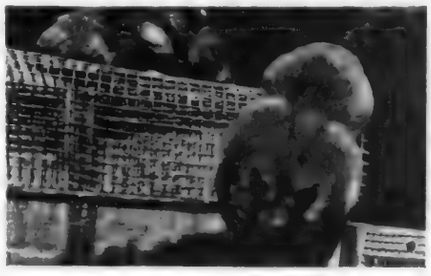
can leave them together for another week and divide them by sexes at four weeks. At this time each female should get her individual apartment. Some breeders prefer to leave the females in herds until they are ready to breed because they believe the exercise they get fighting each other helps keep them strong and healthy. This tussling doesn't scar them seriously and shouldn't worry the owner. Often females separated before they are mature will spend their days loafing and sleeping. Some scrapping seems to be stimulating to hamsters and they often end up in better shape than had they lived as pacifists.

Hamsters are hard to sex. All adults are about the same size and color. The male can be told from the females by examining the sex organs, or easier still, from the outline of the body around the tail. Females have a rounded rump while that of their mates is bluntly pointed and sticks out behind them. This is caused by the testicles being enclosed in the body.

Mother hamsters should be handled as little as possible. When the young are born they are red, naked, and small enough to take a bath in a thimble. They should not be handled for about two weeks, at which age they are running freely around the cage.

A Bit of Sanitation

Hamsters are relatively healthy animals, but cleanliness pays dividends, the same as with other types of livestock. Although their natural odor is negligible, a pen that hasn't been cleaned for several weeks begins to make itself known.



A HAMSTER is half granary

Hamsters aren't immune to vermin but they are seldom bothered much by them. The owner of the Gulf Hamstery, Mobile, Alabama, states, "We have bought as many as 600 hamsters a month, but have never received any with noticeable body infestations." It is a good idea to disinfect all pens occasionally as a guard against these pests. Don't let the hamster's preening and scratching fool you, for usually this is due more to vanity than vermin. Their skins are sensitive and the bedding sometimes irritates them, or the bites they get from scrapping may cause them to scratch. During fights, young hamsters sometimes preen themselves with their back feet, which is their way of

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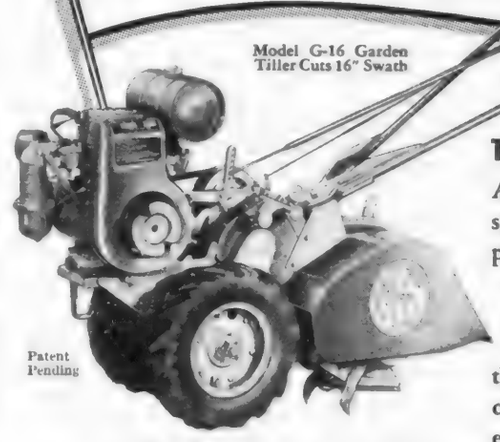

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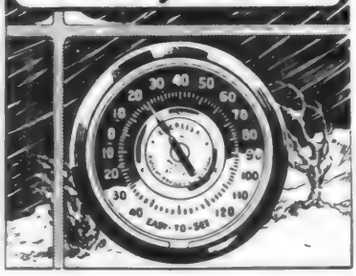

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strutting. These habits have led many people to think that their stock was suffering from lice or fleas when actually the animals were free of the pests.

Then to Market

Before your hamster production line goes into high gear, you will want to have markets. Clinics, laboratories and pet shops are possibilities. When you have the animals, an ad in the local paper may bring sales to hobbyists. A dollar each is a good asking price, and many breeders get up to a dollar-fifty.

Pet shops sometimes carry hamsters, for they make good pets after they are handled for a while. Males make the best pets, and customers who don't want to breed hamsters are usually better satisfied with them. Because the pet shop must make a profit you can expect to take a little less on this market.

Another outlet is the sale of breeding stock to people who want to go into the business. Most hamster growers depend upon this market for their main outlet. In fact, until such time as everyone who wants hamsters has a pair, new breeders can probably make a go of it selling on the open market. Your young hamsters will come in about equal parts male and female, and you won't always be able to supply one male and a half dozen females the way some people will want to buy them. For this reason the females sell at higher prices.

What It Costs to Start

For less than $10.00 you can join the fraternity of hamster raisers. In addition to the breeding stock you will need a small supply of feed, and some material for pens if you can't find serviceable scrap material around the place.

From this inexpensive initial start you can expect an early return unless the market is glutted by the efforts of over-prolific hamsters in your neighborhood. If you get three-week-old stock and breed them at eight, they will have their first litters when you have had them less than three months. Three weeks later you can sell the first young that you don't want to keep for your breeding herd.

Among the leading examples of men who have made the hamster earn them a good living is that of Albert F. Marsh, who operates the Gulf Hamstery in Mobile, Alabama. In 1945 he ordered a pair of hamsters. It turned out to be a pair of males so he sent back for three females. A few months later he had a herd of 2,000. That was when his hobby became a business, for he advertised and since then has filled orders all over the country. He even sent one shipment of breeding stock to Alexandria, Egypt, a modern version of carrying coals to Newcastle, for it is almost the back-yard of the place where hamsters were first discovered.

If you intend to raise them commercially, be sure your market is ready when your hamsters start their production line. If you want hamsters for a hobby, remember that hamsters don't add, they multiply.

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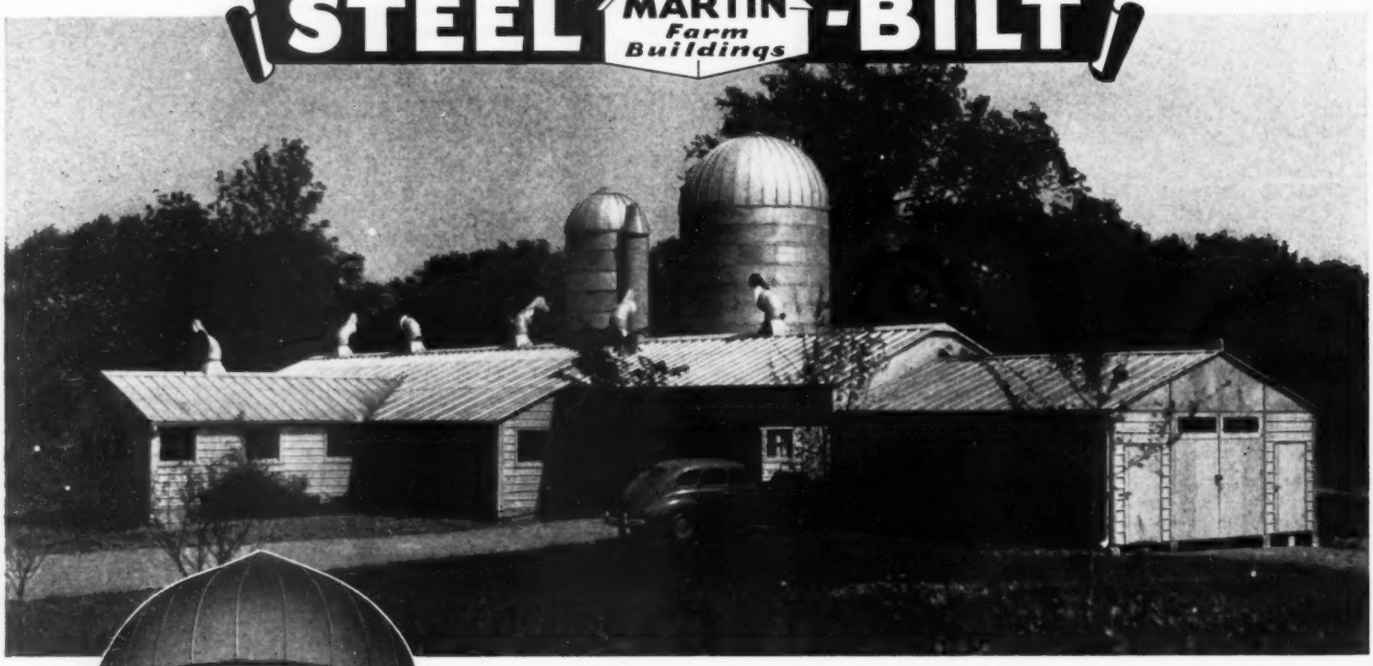

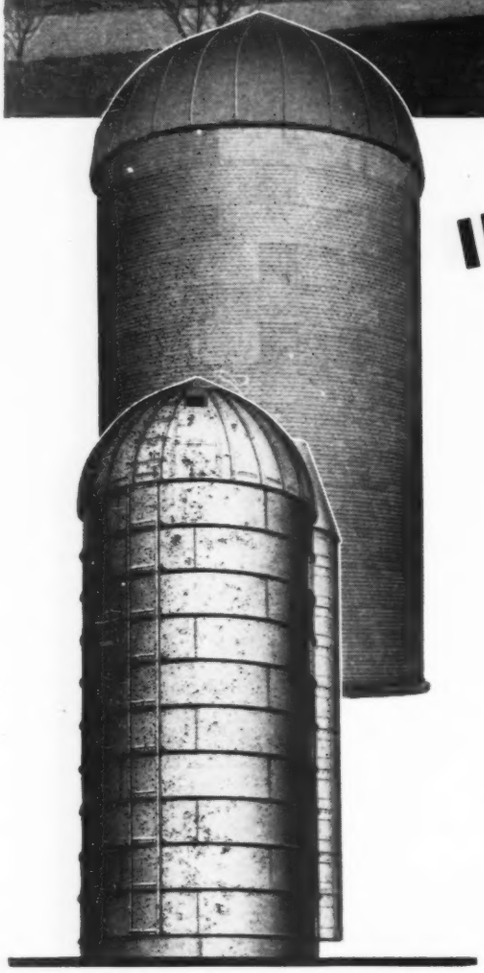

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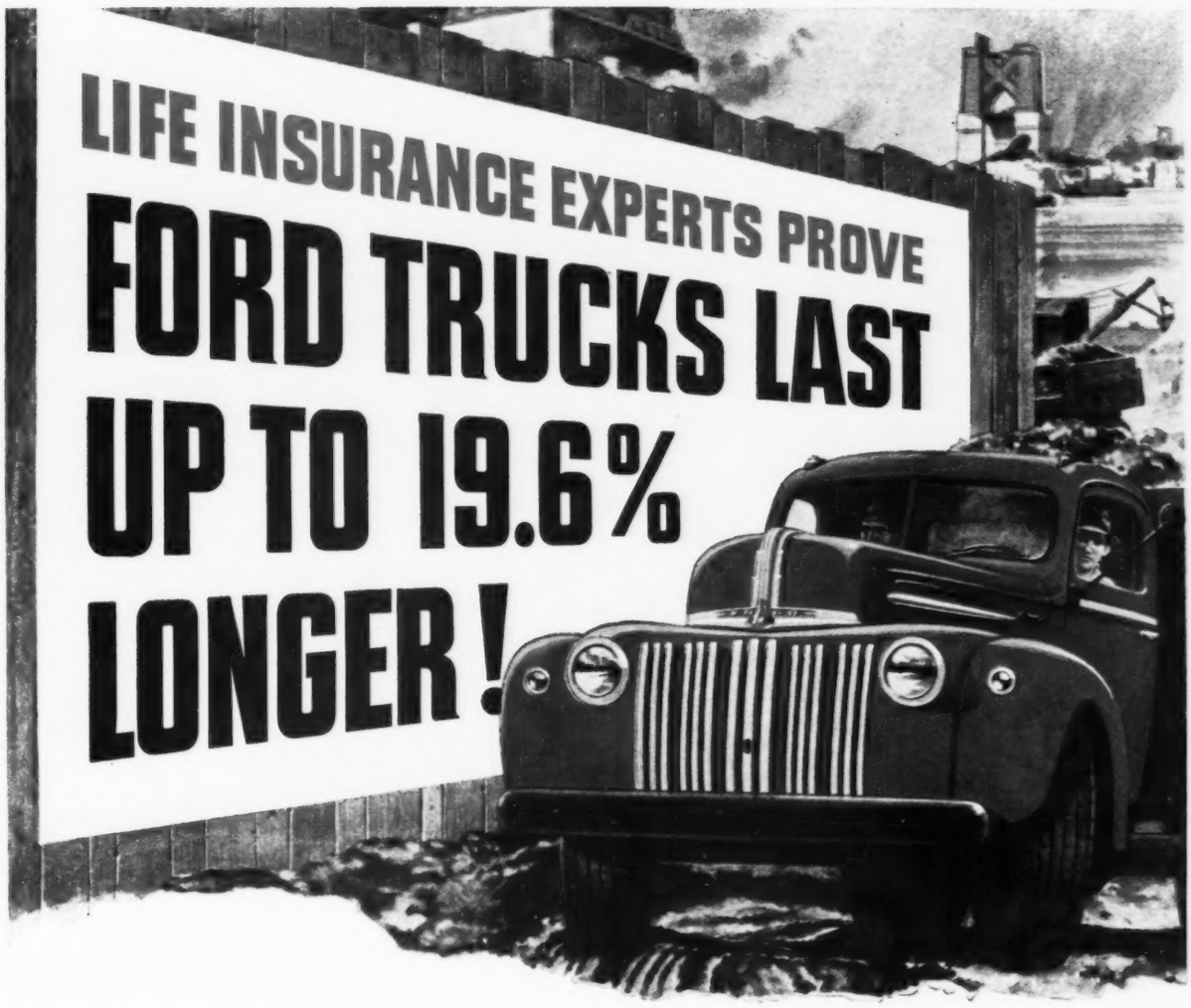

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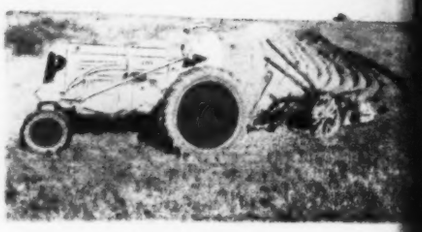

Conserve It!

NATURE gives abundantly to those who wisely manage the "trust fund" of fertility stored in the soil. Like other natural resources, the soil's fertility is limited and calls for intelligent use and conservation. Thousands of acres of lost timberland . . . millions of acres of eroded fields and marginal land scar the earth with ghastly monuments to man's greed and thoughtlessness.

Successful farmers are prosperous businessmen because they know that just as surely as their machinery needs proper servicing, fuel, and lubrication . . . just as surely as their livestock needs proper care and feeding . . . so, too, the soil must have adequate care and food if it is to continue to produce profitably.

Every farm is a manufacturing plant, and like the industrial factory, must have raw materials. When industry is faced with shortages, substitutes can often be synthetically produced. *But there is no substitute for the soil's fertility! Use it wisely; retain, restore, and improve it carefully and constantly!*

All that stands between your high standard of living and starvation is the thin skin of fertility that covers the land areas of the earth. Destroy this surface resource, and life itself would cease to exist.

Minneapolis-Moline takes pride in producing the *quality* MODERN MACHINES, Tractors, and Power Units with which agricultural craftsmen are maintaining and improving our *indispensable* resource—soil fertility. Economy and dependability mark MM as outstanding "machine tools" of progressive farmers who now produce 31% more food, fiber, and oils with 8.3% fewer workers than they did before the war.

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